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JANUARY 1985

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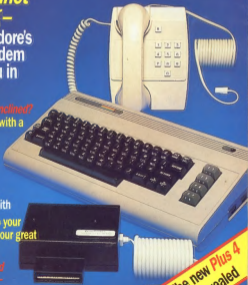
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In the year 2025 A.D. time travel is finally perfected. Scientists of the project send you into the time void equipped with an armed, all terrain vehicle. Your objective is to assist mankind in his various battles: from the prehistoric age to the aftermath of the first conflict. Only a successful mission can assure your return. Features include: Hi-Score table, two player option, two skill levels and continuous play facility.

Commodore 64 £295

Our COMMENT

Welcome to this
month's issue of Your
Commodore. The
editor considers
CompuNet and offers
The compliments of
the season.

HOME COMPUTING HAS long been regarded by the uninformed as a solitary pursuit. We are supposed to sit for days on end, without food or drink, in semi-darkened rooms huddled over the keyboard with only the strange glow of the screen to keep us company. It can happen, of course, though I hint yet to go for a period of longer than two hours without some form (usually liquid) sustenance. All the signs point in the opposite direction but have you tried entertaining people? Show them the two joystick ports on the 40 and point to the increasing number of games which require the use of both. Tell them about the growing number of computer clubs and their ever increasing membership. Show them that programs are written for social purposes and not for their own sake; indeed tell them that many programs, and not just commercial ones, are written by teams of people, someone designing the graphics, someone else the music and so on. All to no avail.

The answer could have arrived in the shape of CompuNet. At last Commodore owners can communicate with each other through the medium of their computers. By attaching the modem to your C64 (if you could be at

the forefront of a whole new form of communication. Of course, windows) of which CompuNet is another manifestation) is not new. Personal and its offspring Microsoft 800 have been with us for some years and it is also true that neither have really fulfilled their initial promise. Personal suffers from a debilitating identity crisis: is it aimed at the business or the domestic user? It began as a method of using all that spare telephone capacity during off-peak times but it was soon adopted by diverse sections of the business community. In order to repair the balance-

Microsoft 800 was started. Directed at the home micro user it offered an innovative and well presented package (and still does) but it never provided — Microsoft provides the information in the form of news, information and software and the user downloads it.

CompuNet offers the revolutionary advance of a two-way service. The user can upload his own software as well as downloading other people's. You can find out more in the article on the new service in this issue. Let me just finish by saying that CompuNet

offers Commodore owners the chance to dispel forever the myth of the computer hermit.

The Plus/4

The other big recent launch from Commodore is, of course, the new machine. Last month we looked at the VIC's replacement, the C16 and word is already coming through that it's selling extremely well. At the price and with its specifications this is not at all surprising. The Plus/4 which we look at this month is rather different. The market does not already exist for it, indeed it will have to create its own.

The idea behind the Plus/4 certainly looks promising and we shall take a look at the built-in software next month.

For the moment the hardware is considered by our reviewer who is not impressed.

All the best

This issue also contains a large number of graphics related articles. The Commodore machines are all renowned for the excellent graphic capabilities but there is also room for improvement. You can choose the solution which most suits you by reading our reviews of lightpens, of logos and the Turbo, of the Beola Plot and of many of the Commodore drawing packages.

So whatever your interest there is something in this issue of Your Commodore for you. And strange as it may seem (and it often contains so) although this is the January issue you should be reading this before Christmas; so from all of us at Your Commodore may we wish you a very merry Christmas and a Commodore filled New Year.





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Following the review
of the Commodore 16
last month, Mike
Roberts places its big
brother, the Plus/4,
under the magnifying
glass.

PLUS/4: HOW DOES IT ADD UP?

THE COMMODORE PLUS/4 IS Commodore's first entry into the top level home/very small business bracket. Commodore said that it wasn't suitable for running a business but went on to say that it could be used in parts of applications by a professional person. This is one of the more honest statements that I have heard a computer company say on the subject of the business use of a home computer. Clive Sinclair once said that you could run a power station on a 256K (16 RAM, 40 ROM) machine!

When this business subject comes from the last built-in software package — word processing, spreadsheets, databases, and graphics — from Plus/4, but more about this in a later article.

Externally the Plus/4 is a graceful, wedge-shaped box with a keyboard taking up most of the room on the top and ports and interfaces taking up the whole of the back and sides. Now it becomes obvious why Commodore opted for the smaller type of connector instead of keeping it the same as they have for ages, if the normal "chunky" type edge connectors and D sockets were used there would not be enough room around the edge of the machine.

The magic touch

The keyboard, even when Commodore's 15" is used, is of quality although some people express reservations when they first get their dabble with it. However, after a period of use everybody loves it.

The keyboard is very similar to the 1644, and is angled, slanted and curved. This makes it operate as a real drum. The layout consists of all keys, 60 of which are normal and 4 function keys



above the top row and four cursor control keys arranged in a cross shape. One odd thing about these keys is that shape, they look like arrows — the way the arrow is pointing indicates the direction that the cursor will go in.

The ports around the back and sides of the box show a departure from the 1644/C16 style. The VIC and 64 are almost identical I/O.

All change

Most things, however, have been changed. The cartridge expansion port has been reduced in size to stop people shoving CBM 64 cartridges into it. I do not know whether the highly advanced structure of the CBM 64s does with its facility for ground pins (which is based on the Plus/4) but given the nature of the machine as a small systems/serious device, this is more

than a distinct possibility.

The Plus/4 supports sideways ROMs: these were first implemented on the BBC micro some years ago and computers are starting to get these featured. Commodore call them "function key packages". The reason for the name change, same is that when the machine boots up it checks to see if there are any ROMs installed. If there are then it will assign each ROM to a function key. The internal software uses the system to pressing it gets you into it, if the ROMs are removed the function key goes back to its original state. Internal ROMs will go on 16. It is unknown how many ROM cartridges can be attached to the machine at once, but there is the possibility of four (RAMC, the "built" ROMs, plus two others).

The two DIN connectors of the CBM 64 have been dispensed with and replaced

with real DIN connectors. This means you can only use Commodore's specific Commodore peripherals and not the best things in the world, even their new "84-00" style ones.

The Cassette recorder socket is also a real DIN connector, this is because the 64 cassette deck is different to the old tape decks. The Plus/4 is at its best with disc drives, including the new high speed ones intended for their new range of machines.

Thankfully, Commodore have left the Serial BUS, and the multi-video connector alone. All Commodore's existing peripherals, that use these ports, will work straight off, so there are plenty printers and disc drives available for the machine. However, it may be worth the wait to get hold of their new discs which use the cartridge port and are a lot faster than the old ones.



Figure 6

Moving on to the internal hardware reveals some surprises. Most of the machine is driven via a single chip. Called either the 7300 or the 7303 chip, depending on your installation, it combines a 6809 processor at 2MHz with a sound generator, timers, input/output, memory banking, and graphics generation. In all it has 16 registers to control these.

Sound quality is as good as the next run's although Intel's has two channels. There can be two sound channels on one sound and one voice (for special effects). Nearly all the advanced sound features of the MD chip have been left out like ADNR, filtering, and modulation.

Graphics capability is superb. It is natural that this will be compared with the Commodore 64 as there are a lot of similarities in spec. However, the graphics are different and there are currently two schools of thought as to which is better the C88 64 or the Plus4.

Simulated conditions

[illegible]

These data are also in the literature. For example, the mean age of the operators in a modern computer graphics laboratory is 37.4 years, with a standard deviation of 11.21 years (range 18-58 years). The mean age of 78 operators in a Japanese computer laboratory, and Hoshino, 503 male users in 40 Japanese firms using various computer graphics modes. The other computer graphics modes are 105 to 200 with the previously mentioned 128 operators being used in a colour image system, and 148 to 280 in a multi-colour frame. Such large numbers have an impact on the results of the study. The results of this research are therefore more robust. There are some other significant modes and systems that have

are only available by FORTEing.
User-defined graphics (UDGs)
are obtained by FORTEing and
are available as a separate

The manual gives no hint of these difficulties. They don't really stretch forward to obstacles. While playing with L2D6s on either featureless landscape, an opponent's A character generator is 36 long. (Only a B-type) The L2M ones are only 16 long. The L2M's are also 16 wide and short of it is that the C16 uses a hardware reverse field attribute. The top bit of the current character is displayed in isolation without it is inverted on not. This has some advantages and disadvantages. The advantage is that the character is always the same. The disadvantage is that you can only have 128 USAs, and finding what is a rapid change was. A reverse field speed is shown as a black square. When you flash a contrast of getting a flashing square of what happens. I think you can't control and you can't control a flashing square (since) either.

Abstract

Other models not shown
reared include Extended
Background Colour mode,
which gives you different
background colours as well as

Background colours, and multi-colour characters where each character can be made up out of a number of colours. There may be others but I'm wary until I get a technical manual to find them out.

Then things are good another point. The BASIC is ideal for an inexperienced user or an beginner of BASIC user, but what about us machine code hackers and people who wouldn't use BASIC if they were paid to?

The answer is **FEDACON**. This is a full-featured assembler, disassembler, assembler, debugger. It is similar to **Intertran 2.5** and is very good indeed. This makes writing assembly language very easy if you already have most of the development software built in.

[illegible]

and may just Cornerstone's great standard. It is informative and instructional for the first-time user. For the experienced person, there are memory maps and register details.

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

the PMA/4 system goes in line with the CMA by having lots of memory, and now comes the good line — the BADC has been in memory long enough to that you can use the extra memory to its full. When you go to use this only cost you down to 10%.

Compare that to a BNC that leaves you with a little of that after fees has taken its chunk out. This means the price of efficient memory will mean that it is now should be a lot of huge adventures and great stride against the cost of an eye there.

That 2400C is identical to the C-16 and all it's doing is adding more to the application base. This is also comparable to more expensive 2400C, keyboard, software built in, and best of all a space amount of space memory. The problems is whether it is worth it at the price — 1,299. This is well below the 286 with which it is comparable. But then the 286 always was overpriced. Only time will tell, as the Plus-4 is carving a new niche in the market.



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TORNADO

20/64

Do you use tapes? Are you sick and tired of waiting for your programs to be loaded? Saved from the tape? Then you need a **TORNADO!** Tornado stores you to Save/Load/Verify your Basic/machine code programs faster than a CMM 1541 disk drive does! Due to popular demand, Tornado now comes with new and more powerful commands plus extra instructions to assist you in making fast versions of your existing machine code/Basic programs. Tornado is available on tape for CMM 64 and 65, - 1/4 20.

BREAKER

20/64

Do your Run/Stop and Pause keys often fail? Do you want to come out of those crashes!! Or get into those unbreakable programs!! Then what are you waiting for, get yourself a **BREAKER!** Reset switch and let your computer know who is the boss!! Breaker can be connected to your machine in seconds, no soldering, included with the Breaker is a copy of basic recovery software on tape. Now available for any CMM 64 or 1/4 20.

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I enclose cheque/P.O. order for the sum of £.....

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Please cut this form and black words only. All prices are inclusive of g.p.s. (small order only, add £2 if outside UK). Please post to:
**BSF CSL, 82 FURNACE DRIVE, CRAWLEY, WEST
SUSSEX RH10 6JE.**

E- DATA STATEMENTS

Commodore in the classroom

COMMODORE WILL BE sponsoring the prestigious 1985 British Computer Society Schools' Computer Quiz. It is committed itself to increasing the number of computers in schools in 1984 and sees this quiz as a vehicle for its education offensive next year. Commodore has contributed sponsorship of over £50,000 including prizes for schools worth over £12,500.

In conjunction with the quiz, Commodore is running a special schools' loan and sponsorship scheme. Every school taking part in the quiz will be offered the free loan of two complete Commodore 64 computer systems for three months and, if at the end of the loan period the school wishes to keep the loaned systems, Commodore will match every £2.50 of the school's own with £4.50.

The quiz comprises a quiz master and six to eight teams and individual rounds of questions. Schools in each area will be asked to select a team of three pupils — one under 12 years, one under 14 years and one under 16 years. Local area heats start in November and

the 40 schools then emerging as winners of the branch finals will each receive a Commodore communications modem for use with Compuserve, Commodore's new on-line database service. The 40 branch finalists will then go on to compete in eight regional finals to win prizes of Commodore 64 computers and 1040 disc drives, in total worth over £1,500.

The eight regional finalists will then compete in a national final scheduled for July 1985. The winning school will receive £1,600 worth of Commodore computers and peripherals, and the runner-up will receive Commodore equipment worth £700; there will also be many different prizes for individual team members.

Commodore plans to follow each regional final with a 'roadshow' giving parents, teachers, children and local people the chance to try out Commodore's range of computers along with their educational and recreational software and the new modem.

Further details are available from Commodore Education Department on 0534-261250.

VIC 20 word processing

ATLANTIC SOFTWARE HAVE released their TOL, TOL range of word processing programs for the VIC 20.

TOL, TEXT 2.0, for the VIC 20 with at least 48 expansion claims to offer full formatting control, text input, editing and insertion in a single mode, with full cursor control, forward and backward scrolling and direct screen editing. This package can be used not only with Commodore printers but also with virtually linked parallel and RS-232C interface printers. TOL, TEXT 2.0, is menu-driven and incorporates machine code sections to speed loading and printing and may be used to print multiple

copies from memory, or documents of any length from files.

TOL, TEXT 2.0 is provided for the VIC 20 with 16K and contains extra features such as embedded characters, embedded characters and printing direct from tape or disc files. Direct keyboard input while printing makes this program suitable for machines and terminals.

The software is available on tape and disc and prices range from £19.95 to £29.95. TOL software is available from Atlantic Software, 28 Park Farm Road, Kingston, Surrey, KT2 1TQ.



Norham Interface

NORHAM MICRO LIMITED have launched their Turboport/CI, a printer interface for the Commodore 64 and VIC 20, following an exclusive UK distribution agreement with the American manufacturer, Telegen Computer Peripheral Products.

This interface enables the Commodore 64 and VIC 20 to be connected to most of the popular makes of printer currently available on the market. It features a DIP switch selector for different printers as well as the printing of enhanced Commodore graphics including reverse

characters, a very fast graphics dump and a special line buffer which doubles the next printing speed on printers without on-board memory.

The Turboport/CI interface also includes an optional plug-in 16K printer buffer to overcome the low print speed of the printer when transferring data to the printer at the computer's maximum speed.

The Turboport/CI printer interface sells for £69.00. Norham Micro Ltd. can be contacted at Norham House, Beeston Road, Beeston, Leicestershire, NG3 6LT; telephone 0714-751201.



DATA STATEMENTS

Discussions are available for the following titles:

WILDENT DREAMS (MOTION PICTURE)
Rental also working on the premise that if you can rent video films why not computer games? This company, from November 9th, will be offering a package of new Commodore games (some for rental only).

These tapes will be available for hire only through video dealers.

Widely known as the
connected at P.O. Box 84
Company telephone 800-
6100

The UN Millennium Goals

IF YOU'RE FAMILIAR WITH ONE of Ultimate Play The Game's programs you'll know why Spectrum owners have about them. *Arif Arif* and *Salvo Maki* are both new classics. Unfortunately, *Chibi Ranshi* has been dropped—and, alas, the *Isaf* of Ranshi is their last game for the Spectrum. It should be out in time for Christmas. It is an arcade adventure in the style of the most recent games and gives you and both the graphics and the sound.

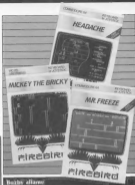
Chicago Play the Game
The Green, André de la Roche
Lafayette, 1941, 320.

One for the road

CRS HAS ALSO RECEIVED approval from the AASHTO's Committee on the American Highway Code. This program consists of over a hundred questions, all of which can be found within the book produced by CRS.

The user chooses either a 21 question test or ten questions test from which the user is given a percentage rating. The program includes a number of graphics which represent load signs and traffic situations. Highway Code[®] will cost 19.95.

CRA can be contacted at CRA Inform, 3 Kings Ford, Caversham Road, London W4 3AL.



Abstract

BRITISH TELECOM's new software house is producing a new range of low-price Pocket computer games under the label Freeland. Mr. Richard Hooper, Chief Executive of British Telecom's Value Added systems and services, hopes that these games, which retail at £3.95, will offer the same

quality as some products costing twice as much." The Commodore and Top Hat 30 sales are included in the initial release. There are all games, but Mr. Hooper hopes to eventually offer "... educational software and other types of programs".

Elavest: www.elavest.com

DEMARCO HOPE THAT A \$25,000 price will do for "Lurella" what million-pound bingo prizes have done for Flavi Street sales, since they expect it to be a number only for Christmas.

Bureau completes five complete adventure stories in one. With a plot unfolding across five time zones from pre-history to the present day. The five adventures can be enjoyed independently and each contains vital clues that lead to the \$25,000 reward. Each adventure starts with a mission and your success in the adventure is aided by your skill as a scientist.

Burka was programmed by Hungarian software company, Andromeda. It took the equivalent of five years to create along with the skills of four graphic artists, two musicians and a professor of film.

The program is screen-painted by a specialist of riddles and verse which, together with the game, leads to a mystery solution on numbers somewhere.

1000

Spanish, which has already been translated into French with a Spanish translator's assistance, is available on the

99 (101-99) for the super-version
and 100 (101-99) for the version.

Overseas enquiries contactable at
125 Museum Road, London
E8 5LE



Introduction

[illegible]

Our evening's first entertainment was at the studios of Acropolis who have acquired from Columbia Pictures the exclusive worldwide rights to develop CD-ROMs using some computer software. The game aims to follow the film closely, using the music and characters from *It's a Wonderful Life*.

As with the last, the game
was over so I walked away

[illegible]

The game is now available on the Commodore 64 at £19.95 and the tape version and £14.95 for the other systems.

[illegible]

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 111–118

COMPUTER GAMES BASED on true-life facts seem to be all the rage. Angus Paine Software will be releasing three games, *Aign*, or *The Assassins*, to promote the release of the sixth horror movie on January 18. The game will be set on over 200 castles across the South of England and its H. P. Lovecraft will lead a competition in the game on the opening night in each town, the prize will be a copy of the game.

As seen in the first of Apple's *Mind Games*, to include PC Personality Control features which set up the personality variables for each game. The behavior of each character in a particular situation is defined first by specific interactions, the history of the personality and further experience in the game.

The point of the game is to try and beat the AI or who you are interacting. I thought in your spaceship, the Astronauts are a class in your struggle by tracks and other weapons, but have your characters get the chance to use them?

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Journal of Internal Medicine 247: 391–397

DATA STATEMENTS

Stock market

KUMA COMPUTERS ARE hoping that, rather than splash out vast sums of money on computer games, that some Commodore users might need some assistance in investing their money. Thus their latest game, 'Stock Market', they have introduced the London Stock Exchange. Players are given three million of company shares and advice, hints and tips for likely good investments — although not all of these are accurate. Players win or lose money through playing and managing investments.

'Stock Market' can be played by 1 to 4p players and costs £6.95. Kuma Computers Ltd can be contacted at 13 Haverhill Road, Pangbourne, Berks, RG6 2PA; telephone 07527 4505.

More Melbourne games

FOLLOWING THE SUCCESS of their 'The Commodore 64 Games Book', Melbourne House have released a sequel, 'Commodore 64 Games Book 2'. Melbourne House claim that the book contains 30 completely new and original games listings, with a CHECKSUM listing supplied at the end of each programme. The reader may determine immediately whether a program typed in contains a transcription error, in which case the line number where the mistake has occurred is pinpointed.

In keeping with the times, Melbourne House have also released the 'Commodore 64 Games Book', which includes a variety of games from educational and simulation games to gambling games. Once again, the CHECKSUM listing is supplied.

'Commodore 64 Games Book 2' retail at £6.95 and 'Commodore 64 Games Book' at £5.95. Melbourne House Publications Ltd can be contacted at Castle Yard House, Castle Road, Richmond TW9 1SL; telephone 01-899 0554.



Continental drift

KOSMOS SOFTWARE HAVE released Commodore 64 versions of three educational titles, The French Master, The German Master and The Spanish Tutor. The programs provide learning aids for thousands of foreign words, verbs and phrases.

Each package consists of a lesson control program and pre-recorded lessons, which can be used in a variety of learning modes and, ideally, a translation text mode. Each language is covered by two cassettes (Level A and Level B), covering different areas of grammar and vocabulary.

Each cassette costs £8.95 or



£12.95 per language, although Kosmos insist that the cassettes may be bought separately as each contains the necessary control program. Kosmos Software Ltd can be contacted at 1 Pilgrims Close, Harington, Newcastle, North U.A. 6LX; telephone 02235 9942.



Spirit Stones

HA, HA, HA! AND NOW what? The dead might be just the beginning! Software Commodore has just launched Spirit of the Stones, an arcade game with 31 locations based on a thrilling map of the island. However, as well as a game, you also get the chance to spin in a treasure hunt for 40 small treasures, each containing a single diamond and for the first 10 days live all of which have been scattered around the island. Fortunately, for perhaps unfortunately, you don't have to take the diamonds to the island to claim the treasure.

Included with the game is the book of the Spirit of the Stones, a tale of smuggling and more, presented which tells the tale of how the treasure game is to be played. The book, written by island resident John Worley, is also fun of what and virtual story to the whereabouts of the stones and one of the first steps for all would-be treasure hunters must be the deciphering of the clues or letters and signs which border the pages.

Those clues enough to unlock the key to the puzzle are first one of the treasures will also be eligible for a share of the big prize fund which will be deposited for every player won. However, the share-out will not be until 1988 or when the £1 million ceiling is reached.

Spirit of the Stones costs £14.95 and is available from Commodore.

SPIRIT of the STONES

THE CLUES
HIDE THE
TREASURE



Travis Talkies

THANK YOU, THANK YOU A series of talks for the Commodore 64 and VIC 20. These arcade games feature speech without the use of a microphone.

The games include Condit, where you fire power balls at various enemies, Pegasus and the Trials of Pegasus where you must fight strong creatures while searching for treasure and instructions in Condit with the language and code name TRAVIS/TALK, where, in the large, important, you must battle with the mid boss of a hostile enemy which has developed a deadly virus which he plans to unleash on the world. Also available from Travis, for the VIC 20, is an educational program called Type Master. Master's Graphics, a VIC 20 only designed to generate high resolution multi-coloured graphics quickly and easily on screen, should be available soon.

Travis Talkies are designed by the American company Game Concepts. Travis Talkies can be contacted at Gamecon House, California Road, High Wycombe, Bucks, HP12 3RT.



Back from Beyond

BEYOND HAVE ANNOUNCED the launch of their Commodore 64 titles — Arkis, Arkis, Mr Robot, and My Chess II.

Arkis is described as a computer mind game, in which players explore a mysterious, multi-level, 'Mazilian' world. Explore with your 'Mazilopole' (a driver in response to danger objects found and solved). Mazilian path system may be a task, which must be solved through the Mazilopole and creative thinking. A goal is to rescue the help or solve future puzzles, or a free beyond action you will need assistance with this game and you, thus, providing a special help. They are also showing a prize to the first player to solve a particularly difficult problem within the game.

In Arkis, players control an 'Arkis' (a robot) in a maze searching a labyrinth for a priceless golden idol. Each Arkis adventure is different and, as the game is loaded, the computer creates an eight level adventure setting from a library of 32 different floors.

In Mr Robot, players use the Robot Factory to create and play their own screen designs on the 4-size and guide Mr Robot around a 32 screen obstacle course, collecting power pills and killing alien bees on the 8-side.

Beyond describe their Chess II, with new levels of play and a debut of 2 as 'the Robot Empire of computer chess program', how battle against the computer on 64 with a view of the chess pieces from the side and the side of the board.

All the games will be available on cassette at £1.95 or on disc at £11.95. Beyond can be contacted at Sector Court 153 Kensington Road London W8 7LE and



DATA STATEMENTS

Planet and Dragon

COM. WARD HAVE RECENTLY released the program 'The Magic Roundabout' for the BBC Spectrum, will be releasing the Commodore version before the end of the year.

The program is based on the BBC's popular children's programme. The game takes place in and around the gardens of the Magic Roundabout where Dougal is trying to build a super house. He is the mastermind team organising the super robot. He needs to complete the construction as the super power them all much needed saving.



Spectrum Line-Up

WORTH COMPUTERS LTD. claim to have produced a spectrum version for the Commodore 64. It sells for £14.95 and should allow you to use all Spectrum BASIC programs and some such as word processors on the 64 without modification.

It should be available just after Christmas on turbo load tasters. We'll believe it when we see it.

Whitby Computers Ltd. can be contacted at 7 Clarks Road, 'Sun the South' park drive, telephone 0947-604665.



December Issue

50. ARCADE 508-509. Some errors in the article 'The BASIC File', p. 7 (December issue, pp. 34-35). They are as follows:

Program 3.1 page 31 — line 140 should read:
500 IF A < 20 GOTO 110

Program 3.2 page 31 — line 110 should read:
510 IF A < 30 GOTO 110

Page 36, column 1 — line 180 should read:
500 IF A < 20 GOTO 100

Program 3.5 page 36, column 1 — line 120 should read:
IF C < 17 THEN PRINT 1

Page 36, column 3, 5 lines from bottom — line 120 should

Commodore 64

COMMODORE 64 CAN now turn their 64 into a musical instrument with a new music package from Commodore. The package is called 'Musical Maker' and comprises software, a book containing 20 popular songs and tutorial material and a 34 key piano style keyboard which fits over the computer keyboard.

'Musical Maker' has been specially developed for the Commodore 64 by Music to be 123, the world's leading music publishers.

The software's eight built-in voices compute instruments such as the guitar, piano and synthesiser; all the parameters of each sound can also be stored to create a new sound within the capability of the Commodore 64. A unique

feature is that the 64 can be loaded around a range of rhythms from waltzes to disco, with pre-programmed bass patterns. You can also use 'Musical Maker' to create three note polyphonic music.

'Musical Maker' starts for those Commodore users with no musical experience with its single step input mode which shows things from the book powered to be entered into memory by note at letter. The rhythm is then 'suggested' on any key and the completed tune is saved by the computer. Finally, the piano keys are duplicated on the screen and light up when the corresponding note is played.

'Musical Maker' will be £19.95 and will be available on disc or cassette before Christmas.

Game of the Century

HERBY WAIN, COLAND DOLAN and Andrew Gander are recognised by the Century Communications Ltd's new arcade game, 'Century Attack'.

After taking off from London, the aim of the game is to pilot your plane across the world's map, avoiding aliens and winning points when catching your fuel gauge. The game, for either one or two players, includes 16 different types of aliens, 16 levels and joystick or keyboard operation.

Booting does wonder

SHIRING PUBLICATIONS Limited have entered the games market through a newly-formed division, 'Working Software', whose first title is made the success of the 'Working Software' computer 'Operation' in the Leisureworld.

'Operation' is an adventure-type game involving a treasure hunt through 120 screens while avoiding a mine of hazards. The program features split screen scrolling and aerial photography through maps.

'Operation' in the Leisureworld ready for 26-95 on the Commodore 64.

Game of the Century

A novel addition is the game 'Century Attack' which provides an alternative to 'Century Attack' which the program looks.

'Century Attack' is available on the Commodore 64 for £19.95. Century Communications Ltd's new arcade game, 'Century Attack' and can be contacted at Park House, 10-11 Cross Street, London W1V 3LE; telephone 01-462-6241.

Home Computers

BRITISH TELECOM BRADFORD have set up the country's first computer information service called 'Home Computers Line'. Customers using a land-line number will find a three-minute tape containing all aspects of computer computing. The information should include cover hardware, software, peripherals and computer world news. For further information contact British Telecom Bradford, Telephone House 11, Bradford, Bradford, B. Yorkshire, BD1 1BA; telephone Bradford 59424.

50. DATA 100-101. Some errors in the article 'The BASIC File', p. 7 (December issue, pp. 34-35). They are as follows:

Program 3.1 page 31 — line 140 should read:
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Program 3.2 page 31 — line 110 should read:
510 IF A < 30 GOTO 110

50. DATA 100-101. Some errors in the article 'The BASIC File', p. 7 (December issue, pp. 34-35). They are as follows:

Program 3.1 page 31 — line 140 should read:
500 IF A < 20 GOTO 110

We apologise for any inconvenience caused to our readers.

A L I E N



In space no one can hear you scream.



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Michelle Jones-Jones



KATHERINE
The Ship's Engineer
Liam-John Lee



WILLIAM
The Ship's Captain
William-John Lee



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Liam-John Lee



ENOCH
The Ship's Pilot
Enoch-John Lee



MICHELLE
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Michelle-John Lee



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Personal files follow –
yours to
command –
well almost!

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Information on Spectra Basic 2.0 (2nd edition) at Commodore Business Machines Ltd

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HYPERSAVE - 64

Preparing the tape to be saved by the Programable RAMP (RAMP BACKUP SYSTEM) is a game changer and a program changer. It can save programs, and independently, the programs can be saved to 1/2" DISK. The RBS is a backup system that can save programs to 1/2" DISK.

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Introducing the new Diskus I, the first 1/2" diskette loader and formatter. It can save programs, and independently, the programs can be saved to 1/2" DISK. The RBS is a backup system that can save programs to 1/2" DISK.

*Loading - saving and saving to 1/2" diskette. It can save programs, and independently, the programs can be saved to 1/2" DISK. The RBS is a backup system that can save programs to 1/2" DISK.

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DOSOFT

3 Oakmoor Avenue, Blackpool FY2 0EL.

If you've got
problems then
Graham Davies is
here to solve them —
if you think we've got
problems, let us
know!

Dear Sir,
I am writing to ask you how do
you program the programs
enable function keys, F1-F4, on
the Commodore 64.
Yours faithfully,
J. Barnwell
Llanfair

We answer:
The function keys on the C64
4 cannot be programmed
from BASIC. If you press one of
these keys, it generates a
character and you can then use
for this character using an
ASCII value. They can be
"programmed" using a lot of
machine code. This patches
into the interrupt and leads to
use of there is a function key on
the first position of the
keyboard buffer. If there is, the
keyboard buffer is filled with
the required character and
remembering that the buffer is
only ten characters long.
Program 1 demonstrates how
this and you can put your own
commands into the data
statements at the end of the
program. Note that a left arrow
indicates a carriage return.



INPUT

Program 1

```
10 DEF FNKEYS(KEY) LOCAL B% IN TAIL:IF FNKEYS=0 1/1/79
20 IF KEY=1:GOTO 100:IF KEY=2:GOTO 110:IF KEY=3:GOTO 120
30 IF KEY=4:GOTO 130:IF KEY=5:GOTO 140:IF KEY=6:GOTO 150
40 IF KEY=7:GOTO 160:IF KEY=8:GOTO 170:IF KEY=9:GOTO 180
50 IF KEY=10:GOTO 190:IF KEY=11:GOTO 200:IF KEY=12:GOTO 210
60 IF KEY=13:GOTO 220:IF KEY=14:GOTO 230:IF KEY=15:GOTO 240
70 IF KEY=16:GOTO 250:IF KEY=17:GOTO 260:IF KEY=18:GOTO 270
80 IF KEY=19:GOTO 280:IF KEY=20:GOTO 290:IF KEY=21:GOTO 300
90 IF KEY=22:GOTO 310:IF KEY=23:GOTO 320:IF KEY=24:GOTO 330
100 IF KEY=25:GOTO 340:IF KEY=26:GOTO 350:IF KEY=27:GOTO 360
110 IF KEY=28:GOTO 370:IF KEY=29:GOTO 380:IF KEY=30:GOTO 390
120 IF KEY=31:GOTO 400:IF KEY=32:GOTO 410:IF KEY=33:GOTO 420
130 IF KEY=34:GOTO 430:IF KEY=35:GOTO 440:IF KEY=36:GOTO 450
140 IF KEY=37:GOTO 460:IF KEY=38:GOTO 470:IF KEY=39:GOTO 480
150 IF KEY=40:GOTO 490:IF KEY=41:GOTO 500:IF KEY=42:GOTO 510
160 IF KEY=43:GOTO 520:IF KEY=44:GOTO 530:IF KEY=45:GOTO 540
170 IF KEY=46:GOTO 550:IF KEY=47:GOTO 560:IF KEY=48:GOTO 570
180 IF KEY=49:GOTO 580:IF KEY=50:GOTO 590:IF KEY=51:GOTO 600
190 IF KEY=52:GOTO 610:IF KEY=53:GOTO 620:IF KEY=54:GOTO 630
200 IF KEY=55:GOTO 640:IF KEY=56:GOTO 650:IF KEY=57:GOTO 660
210 IF KEY=58:GOTO 670:IF KEY=59:GOTO 680:IF KEY=60:GOTO 690
220 IF KEY=61:GOTO 700:IF KEY=62:GOTO 710:IF KEY=63:GOTO 720
230 IF KEY=64:GOTO 730:IF KEY=65:GOTO 740:IF KEY=66:GOTO 750
240 IF KEY=67:GOTO 760:IF KEY=68:GOTO 770:IF KEY=69:GOTO 780
250 IF KEY=70:GOTO 790:IF KEY=71:GOTO 800:IF KEY=72:GOTO 810
260 IF KEY=73:GOTO 820:IF KEY=74:GOTO 830:IF KEY=75:GOTO 840
270 IF KEY=76:GOTO 850:IF KEY=77:GOTO 860:IF KEY=78:GOTO 870
280 IF KEY=79:GOTO 880:IF KEY=80:GOTO 890:IF KEY=81:GOTO 900
290 IF KEY=82:GOTO 910:IF KEY=83:GOTO 920:IF KEY=84:GOTO 930
300 IF KEY=85:GOTO 940:IF KEY=86:GOTO 950:IF KEY=87:GOTO 960
310 IF KEY=88:GOTO 970:IF KEY=89:GOTO 980:IF KEY=90:GOTO 990
320 IF KEY=91:GOTO 1000:IF KEY=92:GOTO 1010:IF KEY=93:GOTO 1020
330 IF KEY=94:GOTO 1030:IF KEY=95:GOTO 1040:IF KEY=96:GOTO 1050
340 IF KEY=97:GOTO 1060:IF KEY=98:GOTO 1070:IF KEY=99:GOTO 1080
350 IF KEY=100:GOTO 1090:IF KEY=101:GOTO 1100:IF KEY=102:GOTO 1110
360 IF KEY=103:GOTO 1120:IF KEY=104:GOTO 1130:IF KEY=105:GOTO 1140
370 IF KEY=106:GOTO 1150:IF KEY=107:GOTO 1160:IF KEY=108:GOTO 1170
380 IF KEY=109:GOTO 1180:IF KEY=110:GOTO 1190:IF KEY=111:GOTO 1200
390 IF KEY=112:GOTO 1210:IF KEY=113:GOTO 1220:IF KEY=114:GOTO 1230
400 IF KEY=115:GOTO 1240:IF KEY=116:GOTO 1250:IF KEY=117:GOTO 1260
410 IF KEY=118:GOTO 1270:IF KEY=119:GOTO 1280:IF KEY=120:GOTO 1290
420 IF KEY=121:GOTO 1300:IF KEY=122:GOTO 1310:IF KEY=123:GOTO 1320
430 IF KEY=124:GOTO 1330:IF KEY=125:GOTO 1340:IF KEY=126:GOTO 1350
440 IF KEY=127:GOTO 1360:IF KEY=128:GOTO 1370:IF KEY=129:GOTO 1380
450 IF KEY=130:GOTO 1390:IF KEY=131:GOTO 1400:IF KEY=132:GOTO 1410
460 IF KEY=133:GOTO 1420:IF KEY=134:GOTO 1430:IF KEY=135:GOTO 1440
470 IF KEY=136:GOTO 1450:IF KEY=137:GOTO 1460:IF KEY=138:GOTO 1470
480 IF KEY=139:GOTO 1480:IF KEY=140:GOTO 1490:IF KEY=141:GOTO 1500
490 IF KEY=142:GOTO 1510:IF KEY=143:GOTO 1520:IF KEY=144:GOTO 1530
500 IF KEY=145:GOTO 1540:IF KEY=146:GOTO 1550:IF KEY=147:GOTO 1560
510 IF KEY=148:GOTO 1570:IF KEY=149:GOTO 1580:IF KEY=150:GOTO 1590
520 IF KEY=151:GOTO 1600:IF KEY=152:GOTO 1610:IF KEY=153:GOTO 1620
530 IF KEY=154:GOTO 1630:IF KEY=155:GOTO 1640:IF KEY=156:GOTO 1650
540 IF KEY=157:GOTO 1660:IF KEY=158:GOTO 1670:IF KEY=159:GOTO 1680
550 IF KEY=160:GOTO 1690:IF KEY=161:GOTO 1700:IF KEY=162:GOTO 1710
560 IF KEY=163:GOTO 1720:IF KEY=164:GOTO 1730:IF KEY=165:GOTO 1740
570 IF KEY=166:GOTO 1750:IF KEY=167:GOTO 1760:IF KEY=168:GOTO 1770
580 IF KEY=169:GOTO 1780:IF KEY=170:GOTO 1790:IF KEY=171:GOTO 1800
590 IF KEY=172:GOTO 1810:IF KEY=173:GOTO 1820:IF KEY=174:GOTO 1830
600 IF KEY=175:GOTO 1840:IF KEY=176:GOTO 1850:IF KEY=177:GOTO 1860
610 IF KEY=178:GOTO 1870:IF KEY=179:GOTO 1880:IF KEY=180:GOTO 1890
620 IF KEY=181:GOTO 1900:IF KEY=182:GOTO 1910:IF KEY=183:GOTO 1920
630 IF KEY=184:GOTO 1930:IF KEY=185:GOTO 1940:IF KEY=186:GOTO 1950
640 IF KEY=187:GOTO 1960:IF KEY=188:GOTO 1970:IF KEY=189:GOTO 1980
650 IF KEY=190:GOTO 1990:IF KEY=191:GOTO 2000:IF KEY=192:GOTO 2010
660 IF KEY=193:GOTO 2020:IF KEY=194:GOTO 2030:IF KEY=195:GOTO 2040
670 IF KEY=196:GOTO 2050:IF KEY=197:GOTO 2060:IF KEY=198:GOTO 2070
680 IF KEY=199:GOTO 2080:IF KEY=200:GOTO 2090:IF KEY=201:GOTO 2100
690 IF KEY=202:GOTO 2110:IF KEY=203:GOTO 2120:IF KEY=204:GOTO 2130
700 IF KEY=205:GOTO 2140:IF KEY=206:GOTO 2150:IF KEY=207:GOTO 2160
710 IF KEY=208:GOTO 2170:IF KEY=209:GOTO 2180:IF KEY=210:GOTO 2190
720 IF KEY=211:GOTO 2200:IF KEY=212:GOTO 2210:IF KEY=213:GOTO 2220
730 IF KEY=214:GOTO 2230:IF KEY=215:GOTO 2240:IF KEY=216:GOTO 2250
740 IF KEY=217:GOTO 2260:IF KEY=218:GOTO 2270:IF KEY=219:GOTO 2280
750 IF KEY=220:GOTO 2290:IF KEY=221:GOTO 2300:IF KEY=222:GOTO 2310
760 IF KEY=223:GOTO 2320:IF KEY=224:GOTO 2330:IF KEY=225:GOTO 2340
770 IF KEY=226:GOTO 2350:IF KEY=227:GOTO 2360:IF KEY=228:GOTO 2370
780 IF KEY=229:GOTO 2380:IF KEY=230:GOTO 2390:IF KEY=231:GOTO 2400
790 IF KEY=232:GOTO 2410:IF KEY=233:GOTO 2420:IF KEY=234:GOTO 2430
800 IF KEY=235:GOTO 2440:IF KEY=236:GOTO 2450:IF KEY=237:GOTO 2460
810 IF KEY=238:GOTO 2470:IF KEY=239:GOTO 2480:IF KEY=240:GOTO 2490
820 IF KEY=241:GOTO 2500:IF KEY=242:GOTO 2510:IF KEY=243:GOTO 2520
830 IF KEY=244:GOTO 2530:IF KEY=245:GOTO 2540:IF KEY=246:GOTO 2550
840 IF KEY=247:GOTO 2560:IF KEY=248:GOTO 2570:IF KEY=249:GOTO 2580
850 IF KEY=250:GOTO 2590:IF KEY=251:GOTO 2600:IF KEY=252:GOTO 2610
860 IF KEY=253:GOTO 2620:IF KEY=254:GOTO 2630:IF KEY=255:GOTO 2640
870 IF KEY=256:GOTO 2650:IF KEY=257:GOTO 2660:IF KEY=258:GOTO 2670
880 IF KEY=259:GOTO 2680:IF KEY=260:GOTO 2690:IF KEY=261:GOTO 2700
890 IF KEY=262:GOTO 2710:IF KEY=263:GOTO 2720:IF KEY=264:GOTO 2730
900 IF KEY=265:GOTO 2740:IF KEY=266:GOTO 2750:IF KEY=267:GOTO 2760
910 IF KEY=268:GOTO 2770:IF KEY=269:GOTO 2780:IF KEY=270:GOTO 2790
920 IF KEY=271:GOTO 2800:IF KEY=272:GOTO 2810:IF KEY=273:GOTO 2820
930 IF KEY=274:GOTO 2830:IF KEY=275:GOTO 2840:IF KEY=276:GOTO 2850
940 IF KEY=277:GOTO 2860:IF KEY=278:GOTO 2870:IF KEY=279:GOTO 2880
950 IF KEY=280:GOTO 2890:IF KEY=281:GOTO 2900:IF KEY=282:GOTO 2910
960 IF KEY=283:GOTO 2920:IF KEY=284:GOTO 2930:IF KEY=285:GOTO 2940
970 IF KEY=286:GOTO 2950:IF KEY=287:GOTO 2960:IF KEY=288:GOTO 2970
980 IF KEY=289:GOTO 2980:IF KEY=290:GOTO 2990:IF KEY=291:GOTO 3000
990 IF KEY=292:GOTO 3010:IF KEY=293:GOTO 3020:IF KEY=294:GOTO 3030
1000 IF KEY=295:GOTO 3040:IF KEY=296:GOTO 3050:IF KEY=297:GOTO 3060
1010 IF KEY=298:GOTO 3070:IF KEY=299:GOTO 3080:IF KEY=300:GOTO 3090
1020 IF KEY=301:GOTO 3100:IF KEY=302:GOTO 3110:IF KEY=303:GOTO 3120
1030 IF KEY=304:GOTO 3130:IF KEY=305:GOTO 3140:IF KEY=306:GOTO 3150
1040 IF KEY=307:GOTO 3160:IF KEY=308:GOTO 3170:IF KEY=309:GOTO 3180
1050 IF KEY=310:GOTO 3190:IF KEY=311:GOTO 3200:IF KEY=312:GOTO 3210
1060 IF KEY=313:GOTO 3220:IF KEY=314:GOTO 3230:IF KEY=315:GOTO 3240
1070 IF KEY=316:GOTO 3250:IF KEY=317:GOTO 3260:IF KEY=318:GOTO 3270
1080 IF KEY=319:GOTO 3280:IF KEY=320:GOTO 3290:IF KEY=321:GOTO 3300
1090 IF KEY=322:GOTO 3310:IF KEY=323:GOTO 3320:IF KEY=324:GOTO 3330
1100 IF KEY=325:GOTO 3340:IF KEY=326:GOTO 3350:IF KEY=327:GOTO 3360
1110 IF KEY=328:GOTO 3370:IF KEY=329:GOTO 3380:IF KEY=330:GOTO 3390
1120 IF KEY=331:GOTO 3400:IF KEY=332:GOTO 3410:IF KEY=333:GOTO 3420
1130 IF KEY=334:GOTO 3430:IF KEY=335:GOTO 3440:IF KEY=336:GOTO 3450
1140 IF KEY=337:GOTO 3460:IF KEY=338:GOTO 3470:IF KEY=339:GOTO 3480
1150 IF KEY=340:GOTO 3490:IF KEY=341:GOTO 3500:IF KEY=342:GOTO 3510
1160 IF KEY=343:GOTO 3520:IF KEY=344:GOTO 3530:IF KEY=345:GOTO 3540
1170 IF KEY=346:GOTO 3550:IF KEY=347:GOTO 3560:IF KEY=348:GOTO 3570
1180 IF KEY=349:GOTO 3580:IF KEY=350:GOTO 3590:IF KEY=351:GOTO 3600
1190 IF KEY=352:GOTO 3610:IF KEY=353:GOTO 3620:IF KEY=354:GOTO 3630
1200 IF KEY=355:GOTO 3640:IF KEY=356:GOTO 3650:IF KEY=357:GOTO 3660
1210 IF KEY=358:GOTO 3670:IF KEY=359:GOTO 3680:IF KEY=360:GOTO 3690
1220 IF KEY=361:GOTO 3700:IF KEY=362:GOTO 3710:IF KEY=363:GOTO 3720
1230 IF KEY=364:GOTO 3730:IF KEY=365:GOTO 3740:IF KEY=366:GOTO 3750
1240 IF KEY=367:GOTO 3760:IF KEY=368:GOTO 3770:IF KEY=369:GOTO 3780
1250 IF KEY=370:GOTO 3790:IF KEY=371:GOTO 3800:IF KEY=372:GOTO 3810
1260 IF KEY=373:GOTO 3820:IF KEY=374:GOTO 3830:IF KEY=375:GOTO 3840
1270 IF KEY=376:GOTO 3850:IF KEY=377:GOTO 3860:IF KEY=378:GOTO 3870
1280 IF KEY=379:GOTO 3880:IF KEY=380:GOTO 3890:IF KEY=381:GOTO 3900
1290 IF KEY=382:GOTO 3910:IF KEY=383:GOTO 3920:IF KEY=384:GOTO 3930
1300 IF KEY=385:GOTO 3940:IF KEY=386:GOTO 3950:IF KEY=387:GOTO 3960
1310 IF KEY=388:GOTO 3970:IF KEY=389:GOTO 3980:IF KEY=390:GOTO 3990
1320 IF KEY=391:GOTO 4000:IF KEY=392:GOTO 4010:IF KEY=393:GOTO 4020
1330 IF KEY=394:GOTO 4030:IF KEY=395:GOTO 4040:IF KEY=396:GOTO 4050
1340 IF KEY=397:GOTO 4060:IF KEY=398:GOTO 4070:IF KEY=399:GOTO 4080
1350 IF KEY=400:GOTO 4090:IF KEY=401:GOTO 4100:IF KEY=402:GOTO 4110
1360 IF KEY=403:GOTO 4120:IF KEY=404:GOTO 4130:IF KEY=405:GOTO 4140
1370 IF KEY=406:GOTO 4150:IF KEY=407:GOTO 4160:IF KEY=408:GOTO 4170
1380 IF KEY=409:GOTO 4180:IF KEY=410:GOTO 4190:IF KEY=411:GOTO 4200
1390 IF KEY=412:GOTO 4210:IF KEY=413:GOTO 4220:IF KEY=414:GOTO 4230
1400 IF KEY=415:GOTO 4240:IF KEY=416:GOTO 4250:IF KEY=417:GOTO 4260
1410 IF KEY=418:GOTO 4270:IF KEY=419:GOTO 4280:IF KEY=420:GOTO 4290
1420 IF KEY=421:GOTO 4300:IF KEY=422:GOTO 4310:IF KEY=423:GOTO 4320
1430 IF KEY=424:GOTO 4330:IF KEY=425:GOTO 4340:IF KEY=426:GOTO 4350
1440 IF KEY=427:GOTO 4360:IF KEY=428:GOTO 4370:IF KEY=429:GOTO 4380
1450 IF KEY=430:GOTO 4390:IF KEY=431:GOTO 4400:IF KEY=432:GOTO 4410
1460 IF KEY=433:GOTO 4420:IF KEY=434:GOTO 4430:IF KEY=435:GOTO 4440
1470 IF KEY=436:GOTO 4450:IF KEY=437:GOTO 4460:IF KEY=438:GOTO 4470
1480 IF KEY=439:GOTO 4480:IF KEY=440:GOTO 4490:IF KEY=441:GOTO 4500
1490 IF KEY=442:GOTO 4510:IF KEY=443:GOTO 4520:IF KEY=444:GOTO 4530
1500 IF KEY=445:GOTO 4540:IF KEY=446:GOTO 4550:IF KEY=447:GOTO 4560
1510 IF KEY=448:GOTO 4570:IF KEY=449:GOTO 4580:IF KEY=450:GOTO 4590
1520 IF KEY=451:GOTO 4600:IF KEY=452:GOTO 4610:IF KEY=453:GOTO 4620
1530 IF KEY=454:GOTO 4630:IF KEY=455:GOTO 4640:IF KEY=456:GOTO 4650
1540 IF KEY=457:GOTO 4660:IF KEY=458:GOTO 4670:IF KEY=459:GOTO 4680
1550 IF KEY=460:GOTO 4690:IF KEY=461:GOTO 4700:IF KEY=462:GOTO 4710
1560 IF KEY=463:GOTO 4720:IF KEY=464:GOTO 4730:IF KEY=465:GOTO 4740
1570 IF KEY=466:GOTO 4750:IF KEY=467:GOTO 4760:IF KEY=468:GOTO 4770
1580 IF KEY=469:GOTO 4780:IF KEY=470:GOTO 4790:IF KEY=471:GOTO 4800
1590 IF KEY=472:GOTO 4810:IF KEY=473:GOTO 4820:IF KEY=474:GOTO 4830
1600 IF KEY=475:GOTO 4840:IF KEY=476:GOTO 4850:IF KEY=477:GOTO 4860
1610 IF KEY=478:GOTO 4870:IF KEY=479:GOTO 4880:IF KEY=480:GOTO 4890
1620 IF KEY=481:GOTO 4900:IF KEY=482:GOTO 4910:IF KEY=483:GOTO 4920
1630 IF KEY=484:GOTO 4930:IF KEY=485:GOTO 4940:IF KEY=486:GOTO 4950
1640 IF KEY=487:GOTO 4960:IF KEY=488:GOTO 4970:IF KEY=489:GOTO 4980
1650 IF KEY=490:GOTO 4990:IF KEY=491:GOTO 5000:IF KEY=492:GOTO 5010
1660 IF KEY=493:GOTO 5020:IF KEY=494:GOTO 5030:IF KEY=495:GOTO 5040
1670 IF KEY=496:GOTO 5050:IF KEY=497:GOTO 5060:IF KEY=498:GOTO 5070
1680 IF KEY=499:GOTO 5080:IF KEY=500:GOTO 5090:IF KEY=501:GOTO 5100
1690 IF KEY=502:GOTO 5110:IF KEY=503:GOTO 5120:IF KEY=504:GOTO 5130
1700 IF KEY=505:GOTO 5140:IF KEY=506:GOTO 5150:IF KEY=507:GOTO 5160
1710 IF KEY=508:GOTO 5170:IF KEY=509:GOTO 5180:IF KEY=510:GOTO 5190
1720 IF KEY=511:GOTO 5200:IF KEY=512:GOTO 5210:IF KEY=513:GOTO 5220
1730 IF KEY=514:GOTO 5230:IF KEY=515:GOTO 5240:IF KEY=516:GOTO 5250
1740 IF KEY=517:GOTO 5260:IF KEY=518:GOTO 5270:IF KEY=519:GOTO 5280
1750 IF KEY=520:GOTO 5290:IF KEY=521:GOTO 5300:IF KEY=522:GOTO 5310
1760 IF KEY=523:GOTO 5320:IF KEY=524:GOTO 5330:IF KEY=525:GOTO 5340
1770 IF KEY=526:GOTO 5350:IF KEY=527:GOTO 5360:IF KEY=528:GOTO 5370
1780 IF KEY=529:GOTO 5380:IF KEY=530:GOTO 5390:IF KEY=531:GOTO 5400
1790 IF KEY=532:GOTO 5410:IF KEY=533:GOTO 5420:IF KEY=534:GOTO 5430
1800 IF KEY=535:GOTO 5440:IF KEY=536:GOTO 5450:IF KEY=537:GOTO 5460
1810 IF KEY=538:GOTO 5470:IF KEY=539:GOTO 5480:IF KEY=540:GOTO 5490
1820 IF KEY=541:GOTO 5500:IF KEY=542:GOTO 5510:IF KEY=543:GOTO 5520
1830 IF KEY=544:GOTO 5530:IF KEY=545:GOTO 5540:IF KEY=546:GOTO 5550
1840 IF KEY=547:GOTO 5560:IF KEY=548:GOTO 5570:IF KEY=549:GOTO 5580
1850 IF KEY=550:GOTO 5590:IF KEY=551:GOTO 5600:IF KEY=552:GOTO 5610
1860 IF KEY=553:GOTO 5620:IF KEY=554:GOTO 5630:IF KEY=555:GOTO 5640
1870 IF KEY=556:GOTO 5650:IF KEY=557:GOTO 5660:IF KEY=558:GOTO 5670
1880 IF KEY=559:GOTO 5680:IF KEY=560:GOTO 5690:IF KEY=561:GOTO 5700
1890 IF KEY=562:GOTO 5710:IF KEY=563:GOTO 5720:IF KEY=564:GOTO 5730
1900 IF KEY=565:GOTO 5740:IF KEY=566:GOTO 5750:IF KEY=567:GOTO 5760
1910 IF KEY=568:GOTO 5770:IF KEY=569:GOTO 5780:IF KEY=570:GOTO 5790
1920 IF KEY=571:GOTO 5800:IF KEY=572:GOTO 5810:IF KEY=573:GOTO 5820
1930 IF KEY=574:GOTO 5830:IF KEY=575:GOTO 5840:IF KEY=576:GOTO 5850
1940 IF KEY=577:GOTO 5860:IF KEY=578:GOTO 5870:IF KEY=579:GOTO 5880
1950 IF KEY=580:GOTO 5890:IF KEY=581:GOTO 5900:IF KEY=582:GOTO 5910
1960 IF KEY=583:GOTO 5920:IF KEY=584:GOTO 5930:IF KEY=585:GOTO 5940
1970 IF KEY=586:GOTO 5950:IF KEY=587:GOTO 5960:IF KEY=588:GOTO 5970
1980 IF KEY=589:GOTO 5980:IF KEY=590:GOTO 5990:IF KEY=591:GOTO 6000
1990 IF KEY=592:GOTO 6010:IF KEY=593:GOTO 6020:IF KEY=594:GOTO 6030
2000 IF KEY=595:GOTO 6040:IF KEY=596:GOTO 6050:IF KEY=597:GOTO 6060
2010 IF KEY=598:GOTO 6070:IF KEY=599:GOTO 6080:IF KEY=600:GOTO 6090
2020 IF KEY=601:GOTO 6100:IF KEY=602:GOTO 6110:IF KEY=603:GOTO 6120
2030 IF KEY=604:GOTO 6130:IF KEY=605:GOTO 6140:IF KEY=606:GOTO 6150
2040 IF KEY=607:GOTO 6160:IF KEY=608:GOTO 6170:IF KEY=609:GOTO 6180
2050 IF KEY=610:GOTO 6190:IF KEY=611:GOTO 6200:IF KEY=612:GOTO 6210
2060 IF KEY=613:GOTO 6220:IF KEY=614:GOTO 6230:IF KEY=615:GOTO 6240
2070 IF KEY=616:GOTO 6250:IF KEY=617:GOTO 6260:IF KEY=618:GOTO 6270
2080 IF KEY=619:GOTO 6280:IF KEY=620:GOTO 6290:IF KEY=621:GOTO 6300
2090 IF KEY=622:GOTO 6310:IF KEY=623:GOTO 6320:IF KEY=624:GOTO 6330
2100 IF KEY=625:GOTO 6340:IF KEY=626:GOTO 6350:IF KEY=627:GOTO 6360
2110 IF KEY=628:GOTO 6370:IF KEY=629:GOTO 6380:IF KEY=630:GOTO 6390
2120 IF KEY=631:GOTO 6400:IF KEY=632:GOTO 6410:IF KEY=633:GOTO 6420
2130 IF KEY=634:GOTO 6430:IF KEY=635:GOTO 6440:IF KEY=636:GOTO 6450
2140 IF KEY=637:GOTO 6460:IF KEY=638:GOTO 6470:IF KEY=639:GOTO 6480
2150 IF KEY=640:GOTO 6490:IF KEY=641:GOTO 6500:IF KEY=642:GOTO 6510
2160 IF KEY=643:GOTO 6520:IF KEY=644:GOTO 6530:IF KEY=645:GOTO 6540
2170 IF KEY=646:GOTO 6550:IF KEY=647:GOTO 6560:IF KEY=648:GOTO 6570
2180 IF KEY=649:GOTO 6580:IF KEY=650:GOTO 6590:IF KEY=651:GOTO 6600
2190 IF KEY=652:GOTO 6610:IF KEY=653:GOTO 6620:IF KEY=654:GOTO 6630
2200 IF KEY=655:GOTO 6640:IF KEY=656:GOTO 6650:IF KEY=657:GOTO 6660
2210 IF KEY=658:GOTO 6670:IF KEY=659:GOTO 6680:IF KEY=660:GOTO 6690
2220 IF KEY=661:GOTO 6700:IF KEY=662:GOTO 6710:IF KEY=663:GOTO 6720
2230 IF KEY=664:GOTO 6730:IF KEY=665:GOTO 6740:IF KEY=666:GOTO 6750
2240 IF KEY=667:GOTO 6760:IF KEY=668:GOTO 6770:IF KEY=669:GOTO 6780
2250 IF KEY=670:GOTO 6790:IF KEY=671:GOTO 6800:IF KEY=672:GOTO 6810
2260 IF KEY=673:GOTO 6820:IF KEY=674:GOTO 6830:IF KEY=675:GOTO 6840
2270 IF KEY=676:GOTO 6850:IF KEY=677:GOTO 6860:IF KEY=678:GOTO 6870
2280 IF KEY=679:GOTO 6880:IF KEY=680:GOTO 6890:IF KEY=681:GOTO 6900
2290 IF KEY=682:GOTO 6910:IF KEY=683:GOTO 6920:IF KEY=684:GOTO 6930
2300 IF KEY=685:GOTO 6940:IF KEY=686:GOTO 6950:IF KEY=687:GOTO 6960
2310 IF KEY=688:GOTO 6970:IF KEY=689:GOTO 6980:IF KEY=690:GOTO 6990
2320 IF KEY=691:GOTO 7000:IF KEY=692:GOTO 7010:IF KEY=693:GOTO 7020
2330 IF KEY=694:GOTO 7030:IF KEY=695:GOTO 7040:IF KEY=696:GOTO 7050
2340 IF KEY=697:GOTO 7060:IF KEY=698:GOTO 7070:IF KEY=699:GOTO 7080
2350 IF KEY=700:GOTO 7090:IF KEY=701:GOTO 7100:IF KEY=702:GOTO 7110
2360 IF KEY=703:GOTO 7120:IF KEY=704:GOTO 7130:IF KEY=705:GOTO 7140
2370 IF KEY=706:GOTO 7150:IF KEY=707:GOTO 7160:IF KEY=708:GOTO 7170
2380 IF KEY=709:GOTO 7180:IF KEY=710:GOTO 7190:IF KEY=711:GOTO 7200
2390 IF KEY=712:GOTO 7210:IF KEY=713:GOTO 7220:IF KEY=714:GOTO 7230
2400 IF KEY=715:GOTO 7240:IF KEY=716:GOTO 7250:IF KEY=717:GOTO 7260
2410 IF KEY=718:GOTO 7270:IF KEY=719:GOTO 7280:IF KEY=720:GOTO 7290
2420 IF KEY=721:GOTO 7300:IF KEY=722:GOTO 7310:IF KEY=723:GOTO 7320
2430 IF KEY=724:GOTO 7330:IF KEY=725:GOTO 7340:IF KEY=726:GOTO 7350
2440 IF KEY=727:GOTO 7360:IF KEY=728:GOTO 7370:IF KEY=729:GOTO 7380
2450 IF KEY=730:GOTO 7390:IF KEY=731:GOTO 7400:IF KEY=732:GOTO 7410
2460 IF KEY=733:GOTO 7420:IF KEY=734:GOTO 7430:IF KEY=735:GOTO 7440
2470 IF KEY=736:GOTO 7450:IF KEY=737:GOTO 7460:IF KEY=738:GOTO 7470
2480 IF KEY=739:G
```

Program 3

```

100 REM *** END OF PROGRAM ***
110 END
120 REM *** END OF PROGRAM ***
130 END
140 REM *** END OF PROGRAM ***
150 END
160 REM *** END OF PROGRAM ***
170 END
180 REM *** END OF PROGRAM ***
190 END
200 REM *** END OF PROGRAM ***
210 END
220 REM *** END OF PROGRAM ***
230 END
240 REM *** END OF PROGRAM ***
250 END
260 REM *** END OF PROGRAM ***
270 END
280 REM *** END OF PROGRAM ***
290 END
300 REM *** END OF PROGRAM ***
310 END
320 REM *** END OF PROGRAM ***
330 END
340 REM *** END OF PROGRAM ***
350 END
360 REM *** END OF PROGRAM ***
370 END
380 REM *** END OF PROGRAM ***
390 END
400 REM *** END OF PROGRAM ***
410 END
420 REM *** END OF PROGRAM ***
430 END
440 REM *** END OF PROGRAM ***
450 END
460 REM *** END OF PROGRAM ***
470 END
480 REM *** END OF PROGRAM ***
490 END
500 REM *** END OF PROGRAM ***
510 END
520 REM *** END OF PROGRAM ***
530 END
540 REM *** END OF PROGRAM ***
550 END
560 REM *** END OF PROGRAM ***
570 END
580 REM *** END OF PROGRAM ***
590 END
600 REM *** END OF PROGRAM ***
610 END
620 REM *** END OF PROGRAM ***
630 END
640 REM *** END OF PROGRAM ***
650 END
660 REM *** END OF PROGRAM ***
670 END
680 REM *** END OF PROGRAM ***
690 END
700 REM *** END OF PROGRAM ***
710 END
720 REM *** END OF PROGRAM ***
730 END
740 REM *** END OF PROGRAM ***
750 END
760 REM *** END OF PROGRAM ***
770 END
780 REM *** END OF PROGRAM ***
790 END
800 REM *** END OF PROGRAM ***
810 END
820 REM *** END OF PROGRAM ***
830 END
840 REM *** END OF PROGRAM ***
850 END
860 REM *** END OF PROGRAM ***
870 END
880 REM *** END OF PROGRAM ***
890 END
900 REM *** END OF PROGRAM ***
910 END
920 REM *** END OF PROGRAM ***
930 END
940 REM *** END OF PROGRAM ***
950 END
960 REM *** END OF PROGRAM ***
970 END
980 REM *** END OF PROGRAM ***
990 END
1000 REM *** END OF PROGRAM ***

```

A Last Defined Character (LDC) is a character specially assigned by a programmer to a point. The CBM 64 has 256 pre-defined characters and a subset pointing at these 128 are stored in ROM. You can change the writer to point elsewhere in RAM and define your own characters. On the 64 you have to redefine all of the characters up to the last thing to do is to copy all of the character information out of ROM and then redefine as many as you require.

Dear Sir,
I am strongly thinking of purchasing a disc drive for my Commodore 64. But, I have read in different magazines that the Commodore 114 disc drive is a little bit sluggish. Please could you tell me whether there are any other disc drives which are compatible with the Commodore 64. Yours faithfully,
Gordon Lee
Steve Sussex

We answer,
There are no other disc drives that may be directly fitted on

to the CBM 64. This is due to the dedicated serial port used by Commodore. The speed of the 114 is mainly limited by the speed of the cable. There is at least one add on extra that you can buy that will considerably speed up the 114 but might have other memory or buffer limitations. Alternatively you can buy an 114 cartridge (which should plug onto the game ports and the two tapes up the side of the 114) which includes the Commodore single and twin 5.25 versions as well as hard disc, two port (double) and so on. A cartridge like this may cost around £25.

Dear Sir,
Two weeks ago I bought a Commodore VIC 20 computer from a local shop. The computer was reduced in price from £729.95 to £699.95. Not knowing very much about computers, but interested enough in buying and for my own education as well as my children's, I thought the offer represented a good buy. Unfortunately, having bought the unit I now find that software availability is being run down for the particular

machine. Furthermore, I am concerned that the supply of 114 RAM may prove difficult as shops are running down stocks in order to make way for the new Commodore 16.

At the time, it was not made aware of the forthcoming change in machines and I am anxious to find out if the new Commodore 16 software can be used on the VIC 20, or if an expansion unit can be obtained to bring it up to date with the '16'. If so, where can I purchase such a unit?

Having read your first issue of the magazine, I am delighted that a section on VIC Games Programming is available in an easy to understand format. However, in view of the difficulties described above, could you let me know where I can get games such as 'Wish You', described on page 15 of your October issue, and also whether my computer can be upgraded or not. Yours faithfully,
P J Jones
Bedford

We answer,
Commodore 16 software will not run on the VIC 20. As the machine is being phased out, stocks of games will undoubtedly dwindle although all the current owners will still want to buy new games. There are still plenty of shops stocking a large range of excellent games. If you have trouble getting software or RAM expansion boards then there are certain to be adverts in your local press from people wanting to sell their second hand equipment. The VIC 20 cannot be upgraded to become a Commodore 16.

Surebrook who released Multitasker are at Royal London House, 198 Deodar Road, Mitcham Surrey M21 2JE.

Dear Sir,
I have a VIC 20 and a Zero Discrom. Can I add a RAM card to get 64K, and use the 'other' 256 game I understood enough to sneak in out of the card. The October issue of Your Commodore said "There is limited 64K of RAM" (Mastering Machine Code, p.1) although I have a VIC 20. Have I come 'bumping around' too much my card?
Also doesn't one but all helps? I have to not speak English! Can you assist? Yours faithfully,
B J Evans
Dorset

We answer,
The price was referring to the CBM 64 which it was. There is indeed 64K of RAM - 128 not

know anything specific about this particular RAM card but there are some guidelines I can give. There must be a manual supplied with it telling you how to use it. If the manual is unclear then, by getting in contact with the manufacturer, the principle is, probably be one of paging banks of RAM in and out. This means that you get bank one which contains ROM, then you page the out and page bank two in and access the second ROM. To access the first bank, you have to page it back in again. Therefore you can look at either bank but not both at the same time.

Dear Sir,
I have just purchased a Commodore 64. I wish to say I am lost! The book tells the program. Could you advise me on a better book (or books) where all the graphics symbols are listed? Yours faithfully,
J Davis
Blackburn

We answer,
The best all round guide going, temp it and references, software, information and data charts is the Programmers Reference Guide which costs about 1.95 from "all good computer shops."

Dear Sir,
Please can you help me with a simple problem. I am having great difficulties trying to drive a random number generator in a machine code program on my C6404. Have you got any ideas?

We answer,
There are a number of ways of doing this. Firstly, you can use any of the memory locations on the 64 which are constantly changing. A good example of this is the clock. You can do time any variable length operation in your own code such as how long a boy is passed down.



We've got the Talent and our games prove it!



"Khalani is a beautiful game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*



BATTLE M

Battle M is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*



LASER HOPPED

Laser Hopped is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*



ATCHAPELAGO

Atchapelago is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*



WEST

West is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*



PANORAMA

Panorama is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*

SOFTWARE FROM SCOTLAND

Software from Scotland is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*



Software from Scotland is a fast-paced action game that is both challenging and fun. It is a great way to spend time with friends and family. The graphics are excellent and the sound effects are great. I highly recommend this game to anyone who is looking for a new challenge." - *GameSpot*

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Game Title	Platform	Release Date	Price
Khalani	Amiga	1990	£19.95
Atchapelago	Amiga	1990	£19.95
Battle M	Amiga	1990	£19.95
Laser Hopped	Amiga	1990	£19.95
Panorama	Amiga	1990	£19.95
West	Amiga	1990	£19.95

For more information, please visit our website at www.talent.co.uk



Display the time of day on the screen whilst programming with this handy machine code routine from Les Allan.

HAVE YOU EVER WONDERED how much time is spent on the family computer when writing or debugging a program? Well there's a chance to find out with a simple screen clock that can be used either as a digital clock to keep an eye on things, or as a time elapsed indicator.

The kit also includes the computer in the Complex Interface Adapter (CIA) chip which performs as well as many other things the time of Day Clock (TOD). This is a special purpose timer for real time applications. The TOD consists of a 24 hour (ANALOG) clock with 10^{-3} and resolution timing segments and 4 separate registers: 100s of a second, seconds, minutes, and hours. The ANALOG flag is located on



SCREEN CLOCK



the ROM of the board requires.

A specific sequence of instructions can be followed for the proper setting of the TCC. TCC is automatically stopped whenever a write is made to the A/D register and will not start again until a write to the TCRs of a second register that means that the TCC will move back at any desired time away from the current time it began until the final write to the TCRs of seconds is made.

clock can be updated. The only restriction to this program is that the interrupt pointer must not be shared by any other program.

The program works by taking the HLT value of data, converting it to binary coded decimal, carrying out a check to see if it is within the legal range and adding into memory. This data has been saved because it keeps the data statement fully, makes it easier to read and in the working code of the machine. Knowing that the final clock sum is 0.06 the machine code routine is activated and the display set to enter the correct time of day. Time trapping is again provided to ensure that only the legal range of time can be entered. When the clock has been correctly entered, pressing any key will start the clock from that desired time.

Combination changes

The program has been arranged to create patterns of coins for the clock. However, since and during the same purpose for the routine is to

the machine code routine it is essential that no routines are made so the program will not consider coins if it is changed and must that a code is made before entering or changing these values.

Clock output
Binary value
Hex value
Clock value

0000 00 00 00 00
0001 01 00 00 00
0010 02 00 00 00
0011 03 00 00 00

a coin a check to be made on time when programming is over, if a change to these combinations is necessary then a few sample entries at 1 that is required.

Warning!!

As these locations are used by

To turn on the program clock at any time all that is required is to enter 000000. It is run of the program clock after 000000 or Press, 0000000000 and 0000000000.

Further information on the TCC can be found from the Programmer's Reference Guide Appendix A4 on page 401.

Program Listing

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**Simon Rockman talks up
Commodore's new number,
CompuNet, an on-line
database service for the
Commodore 64.**

COMPLAIN! IS THE BIGGEST THING that has happened to the Commodore 64 since the launch of its sophisticated users' age. When you buy the Commodore communications modem you get a year's free subscription to the new database service. Anyone who is used to dial-up on-line will find CompuNet a little better. PRISTIL and Bulletin board PRISTIL is a passcode system where only verified subscribers (Information Providers IP's) are allowed to put up signs. However, CompuNet has had a section called "The Jargon".

Here anyone can put up a page of text as a program and charge for it. When another user wants to read that page or to read that program they can buy it. The money is automatically debited from their account with half of it going to the person who provided the information and the other half to CompuNet. The maximum price for a page is \$999.99.

When dealing with reports like this the system needs to be secure against the vandals and hackers who could put up a page under their own name and then use a stolen ID and password to read it. CompuNet is one of the most secure public systems available. Every Commodore modem has its own fingerprint, a code number built into it which is specific to your ID. To use a different program you need a different modem. This level of security should open the door to major transactions such as buying, holding and even banking. The system sounds great so let's look at what happens when you go to use it.

CompuNet in use

After the small black box arrives from Commodore you run to the computer and, seeing the package, the manual is a single lively sheet of paper, the rest of it in the modem. It has never explained why people call it using paper directions when they could use the computer they are talking to do the work of looking things up for them. The modem answers in 80 ROMs. The help you request must number and enter the number necessary for a connection with the CompuNet mainframe. The rest of the routine need to be loaded, from tape, disk or from the mainframe itself, it is as this last item that the program is first sent to you.

To call up the mainframe you simply press shifted C, return, shift S the connect command and prompt you with the question "Dial Number?". Depending on where you are in the UK you dial a telephone number given in the help which enters you the modem, the modem then dials the number out like a

CALLING CompuNet



normal telephone. When the modem finishes dialing it prompts you with the message, "Connecting" and then the border changes colour as it connects. CompuNet does not have a mainframe to tell (although this is supposed to change) it shares time on a DDC to maintain several big ADP computer services, whose telephone lines are so busy while the two computers seem to be doing nothing during logging as they are in fact chatting away, logging you into the nearest area of the DDC and establishing who you are from the code number in your modem.

When these formalities are completed CompuNet asks you for your ID and password. The ID is an eight letter code which is used to identify you as the owner of any information which you upload. At the moment the passwords can only be changed by CompuNet; however the facility for the user to change the password will become available and will add an extra level of security.

Once logged in, CompuNet gives the level of dialing and logging you're at. It is not what software you have loaded before you logged in. If you have the latest version of the very software the system lets you straight through. If you have not got anything soft loaded (software from tape or disk) then CompuNet sends you the software you need. This is not so boring and takes a little while. The process is a little slower than using a 1641 disc drive and yes, although this seems like a waste of time on the end of the telephone call, tape drives may decide to link every once they log in rather than wait for entering tape to load. If the extra software has been updated since you last used it the system is a send you an update.

Because the mainframe always knows what system you are using in CompuNet 64, it can send you material and expect you to be able to run them. It was if it possible for you to have a program which shares the work between the mainframe and the modem. This would speed up the



If you need some help in creating your own games, follow this new series from David Rees.

GAMESMANSHIP

IN THE FOLLOWING SERIES, I hope to be able to give you an insight into creating your own fast, impressive and well packaged action games. The series contains four parts, the first three of which will contain ideas, examples and solutions.

Part one deals with the background, probably the most important part of any action game. The concepts of the playing fields are to move objects and (b) restrictions have you (the good guy), (c) your indirect restrictions (eg. your own boat), or (d) the computer's logic or the bad guy.

The first thing to consider concerning the background is series and, more especially, their limitations. It is very easy to make a game which you

wipe out the screen in one fell swoop, but this would not be challenging enough. Thus, a game has to be difficult to make or more fun. There are two ways to make a game more challenging: you can make the enemy more intelligent or vicious, or you can limit your own movement/weaponry. The second choice is better in the case as it speeds up the game. Intelligence, or enemy weaponry, takes up plenty of processing time and would turn a BASIC game into a slow job. Once the foreground format is clear and you sit out on the background (which part two will cover).

Here the format is decided, you have to implement it. It is up to you how you do this, but no help-speed things up, it have

included some machine code techniques. An explanation of each one follows. Note that the first listing gives a general way to POKE the machine code to memory. You can put as many routines as you want into memory, in any order, and at any variable location with the following limitations, each routine is no more than 256 bytes long and it must fit all the

rules before using the routines.

Rule the first: On using the routine via 575 (routine start), every value that you want to move will be moved by a predetermined amount of 1 and/or 2 directions. The routine is very quick, as you can POKE in values before the main part of the game starts, as we do during a POKE sequence as below.

```
POKE 57500+sprite no;
POKE 57500+sprite no;
POKE 57500+sprite no;
POKE 57500+sprite no;
x1, 2 increment;
x1, 2 add(1) or subtract (2);
x1, 1 increment;
x1, 1 add(1) or subtract (2);
```

routines are spaced the counter apart, the code is used by 575. Most of the code releases 80 bytes, used as locations 57500-57547 must be

empty too. The measure whether a collision has occurred between up to eight pairs of sprites that have been defined beforehand. Sprites

Program Listing: 1

```
1 001 *****
2 002 485: 100,100, 100
3 003 100: 100,100, 100
4 004 100
5 005 100
6 006 100
7 007 *****
8 008 100: 100,100, 100
9 009 100: 100,100, 100
10 010 100: 100,100, 100
11 011 100: 100,100, 100
12 012 100: 100,100, 100
13 013 100: 100,100, 100
14 014 100: 100,100, 100
15 015 100: 100,100, 100
16 016 100: 100,100, 100
17 017 100: 100,100, 100
18 018 100: 100,100, 100
19 019 100: 100,100, 100
20 020 100: 100,100, 100
21 021 100: 100,100, 100
22 022 100: 100,100, 100
23 023 100: 100,100, 100
24 024 100: 100,100, 100
25 025 100: 100,100, 100
26 026 100: 100,100, 100
27 027 100: 100,100, 100
28 028 100: 100,100, 100
29 029 100: 100,100, 100
30 030 100: 100,100, 100
31 031 100: 100,100, 100
32 032 100: 100,100, 100
33 033 100: 100,100, 100
34 034 100: 100,100, 100
35 035 100: 100,100, 100
36 036 100: 100,100, 100
37 037 100: 100,100, 100
38 038 100: 100,100, 100
39 039 100: 100,100, 100
40 040 100: 100,100, 100
41 041 100: 100,100, 100
42 042 100: 100,100, 100
43 043 100: 100,100, 100
44 044 100: 100,100, 100
45 045 100: 100,100, 100
46 046 100: 100,100, 100
47 047 100: 100,100, 100
48 048 100: 100,100, 100
49 049 100: 100,100, 100
50 050 100: 100,100, 100
51 051 100: 100,100, 100
52 052 100: 100,100, 100
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54 054 100: 100,100, 100
55 055 100: 100,100, 100
56 056 100: 100,100, 100
57 057 100: 100,100, 100
58 058 100: 100,100, 100
59 059 100: 100,100, 100
60 060 100: 100,100, 100
61 061 100: 100,100, 100
62 062 100: 100,100, 100
63 063 100: 100,100, 100
64 064 100: 100,100, 100
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66 066 100: 100,100, 100
67 067 100: 100,100, 100
68 068 100: 100,100, 100
69 069 100: 100,100, 100
70 070 100: 100,100, 100
71 071 100: 100,100, 100
72 072 100: 100,100, 100
73 073 100: 100,100, 100
74 074 100: 100,100, 100
75 075 100: 100,100, 100
76 076 100: 100,100, 100
77 077 100: 100,100, 100
78 078 100: 100,100, 100
79 079 100: 100,100, 100
80 080 100: 100,100, 100
81 081 100: 100,100, 100
82 082 100: 100,100, 100
83 083 100: 100,100, 100
84 084 100: 100,100, 100
85 085 100: 100,100, 100
86 086 100: 100,100, 100
87 087 100: 100,100, 100
88 088 100: 100,100, 100
89 089 100: 100,100, 100
90 090 100: 100,100, 100
91 091 100: 100,100, 100
92 092 100: 100,100, 100
93 093 100: 100,100, 100
94 094 100: 100,100, 100
95 095 100: 100,100, 100
96 096 100: 100,100, 100
97 097 100: 100,100, 100
98 098 100: 100,100, 100
99 099 100: 100,100, 100
100 100: 100,100, 100
```





Fend off alien and
bomb attacks with
your powerful laser in
this game from F.G.

Tout.

In this, Game Boy's Commodore 64, you control a powerful laser that cuts its track. You see, also, under attack from various alien (and things).

To load the game, hit **clear** run-up. Place the joystick in **port 2** left = left, right = right, fire button = fire.

You start 50 points for each alien destroyed and 100 points for each bomb hit. Watch those bombs, they will

LASER TRACK

blow up the track, hit the damaged track or an alien and you lose a life.

You start with 3 lives and get an extra one every level. The game includes 12

waves, 75 levels of difficulty, all 8 speeds, screen scrolling and background music.

Program Listing: Laser Game

```

1000 REM ***** LASER TRACK *****
1010 REM ***** F.G. *****
1020 REM ***** 1988 *****
1030 REM ***** 100 *****
1040 REM ***** 100 *****
1050 REM ***** 100 *****
1060 REM ***** 100 *****
1070 REM ***** 100 *****
1080 REM ***** 100 *****
1090 REM ***** 100 *****
1100 REM ***** 100 *****
1110 REM ***** 100 *****
1120 REM ***** 100 *****
1130 REM ***** 100 *****
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1180 REM ***** 100 *****
1190 REM ***** 100 *****
1200 REM ***** 100 *****
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1270 REM ***** 100 *****
1280 REM ***** 100 *****
1290 REM ***** 100 *****
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1920 REM ***** 100 *****
1930 REM ***** 100 *****
1940 REM ***** 100 *****
1950 REM ***** 100 *****
1960 REM ***** 100 *****
1970 REM ***** 100 *****
1980 REM ***** 100 *****
1990 REM ***** 100 *****
2000 REM ***** 100 *****

```



ANIROG

ZAGA

MISSION

This diagonally
scrolling maze game
features superb 3D
graphics brilliant sound

effects and requires 100% concentration to successfully manoeuvre your
helicopter through unknown hazards in order to complete Zaga Mission
and live to play another day — Commodore 64 — £7.95

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Branching and the status register are the subjects of this month's installment of our machine code series from A.P. and D.J. Stephenson.

MASTERING MACHINE CODE

WHEN PROGRAMMING IN BASIC, the BASIC's statement provides an easy way of introducing a decision. The conditions can be quite complex, such as:

IF A = 10 THEN GOTO 100
IF A > 10 THEN GOTO 200
IF A < 10 THEN GOTO 300

Now, it is not so easy in machine code. In the first place, the decision options are known as branch instructions and there are only eight to choose from as can be seen from Table 4.1. As usual, we are used to not care the operand is one byte long and can be specified by two hex digits.

TABLE 4.1

Instruction	Assembly	Hex code
Branch if not above	BNA	00
Branch if not below	BNB	01
Branch if not equal	BNB	02
Branch if not less	BNB	03
Branch if not greater	BNB	04
Branch if not greater or equal	BNB	05
Branch if not less or equal	BNB	06
Branch if not equal	BNB	07

What does it mean when, for example, we write BNA? We can see from the table above that it means "branch if not equal," but it immediately poses the question — branch if WHAT is not equal? The answer to this is — if the Z bit in the present status register is 0. It would be a pity at this point if you turn back to Part 2 of the series, where you will find details of the flags in the register and the conditions under which they are set to 0 or cleared to 1. You will see that an appropriate flag is updated automatically after most of the instructions. So, the referring to BNA in an example, the branch will take place only if the last instruction caused a non-equal result. Thus to see the microprocessor will examine its present register to see if the Z bit was a 0. The opposite instruction, BNE, can





be used to test if the last result was zero — one branch will now take place if the Z bit is 1.

Another pair of branch instructions is BPL and BVM. A branch takes place with BPL only if the V bit is 1. You will remember from Part 1 of the series that using a byte negative number as two's complement notation always have a 1 in the sign position, but positive numbers always have a zero. So, if you are working in two's complement (but you won't), always test, you can use either BPL or BVM as appropriate, to test the sign of the last result. It is worth mentioning here that these two instructions may not be used as frequently as the other branch instructions.

BCI and BIC are another pair of operands. These are used to test if the last operation caused a result which was "too big" to be handled by a single byte, so forcing a "carry out". The carry bit is captured in the C bit position of the status register. With BCI, a branch takes place only if the C bit is 1. With BIC, a branch takes place only if the C bit is 0.

The final pair of operands are BVC and BVS. A branch takes place with BVS only if the V bit is 1. In other words, you can use either the last result caused two's complement overflow because it did, the V bit is set to 1. However, "two's complement overflow" must not be confused with the carry-out condition mentioned earlier. Instead, it is possible for the carry-out condition to exist without a carry-out occurring and vice versa. In case this seems strange to you, consider

what happens if we add 1 to +127 in two's complement binary.



If we treat the result (128 in decimal) as a pure binary absolute number, it is quite smaller than the other hand we interpret the result a two's complement, it is clearly absurd because 128000 is +128. Although there has been no carry out, an overflow condition is caught that which would set the V bit to 1. The biggest positive two's complement number which can be held as a single byte is 127 so, if we try to add 1, we must expect the result to be invalid in overflow in fact. This is a tricky business, so it is worth one more example.



If we add plus five, 1, the result should be one, as indicated above, shown. There is therefore no overflow condition and yet there is a carry out — which is good! So, the V bit would show a zero. The C bit would show a 1 after this example. This shows however the point we are trying to make, it is the way we interpret the arithmetic that determines whether we ignore the C bit or the V bit. It must be fairly established in your mind that "overflow" is a condition which only makes sense if you are conducting arithmetic in

two's complement form if you are working with absolute numbers only (a positive concept of overflow, as signified by the V bit, has no meaning later in the series, when we deal with peripheral controls, we see that the V bit is employed as another role, quite unrelated to overflow).

Calculating branch operands

We have, in the preceding paragraph, frequently mentioned that "the branch operand is — say, six". The real logic of a system is how we work out the branch destination in RAM, of course, we just say GO10 followed by a line number, the CPU'll do this in machine code because the concept of line numbers does not exist. Even if we had an assembler listed, we still couldn't use a line number as a branch destination. The operand in a branch instruction is a number which, if the instruction is true, offsets the microprocessor from many bytes forward (or backward) the next instruction to be found. This is called relative addressing because it indicates a destination address or byte to the present address. Only the eight branch instructions use relative addressing.

To understand the mode of addressing, we should be clear in our minds as to the role of the most important register in the microprocessor, the Program Counter (PC). This is a 16-bit register which always

contains the absolute address of the next instruction byte to be executed. As you already know, a machine code program is simply a set of bytes, stored in memory in sequence, addresses. Suppose these program bytes are stored in a block from address 1C000 (16382 decimal) onwards. To execute the program, we can simply reset the PC to address 1C000 (16382) and allow the microprocessor of 48602 to be loaded into the program counter. The sequence of events is then entirely automatic: the instruction byte at address 16382 is brought into the microprocessor and processed, after which the program counter gives us the next sequential byte to be processed so on. However, if a branch instruction is encountered and read here, as true, the operand byte of the instruction is added to the present contents of the program counter. The next sequential action is then replaced by a random jump to a new instruction byte address. Once the new address has been reached, the program counter proceeds in order to sequential fashion from that new address. An example may be:

1. Assume the program contains a set of bytes located from address 1C000 onwards.
2. Now assume the program has reached the second byte of the instruction 04d 567 located at address 1C001. The program counter will then contain 1C002 — the next instruction byte address.
3. If the branch condition



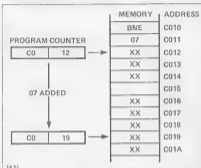


Fig. 41

are true and the branch is taken, the operand (07) will then be added to the program counter which will then contain \$C019. The next instruction byte to be executed will then be taken from the address — seven bytes forward. If the branch could have been not true, the program counter would not be altered and the next instruction byte at \$C012 would be executed.

Figure 41 illustrates our example and should be carefully studied.

you will be able to work out that 07 can be calculated as follows:

```

00000011
+ 00000007
-----
00000018

```

Step 4 we write, say, BNE 07, and the condition is true, it is

case 2 to be subtracted from the program counter. Figure 42 illustrates this example.

It should be realised, from previous discussions on two's complement, that the maximum number of forward bytes which can be used with any branch is 127 and the

maximum backward bytes, 128. This is because the operand of a branch instruction can only be one byte long.

Fortunately, it is very unusual in practical programming to require branches greater than those allowed here. However, as we shall see next, there is a way of overcoming the problem, should it ever arise.

Advances in machine code programs can often be traced to improved branch operands because it is so easy to be sent out in the byte count. Another problem is the status register flags. When a branch instruction is encountered, the current state of the flags determining whether or not the branch takes place. Here, it, but not always, it is the effect of the last instruction which is being tested. However, some instructions do not affect the status flags, in which case, the test is dependent on earlier instructions.

The following instructions have no effect on the status flags: STA, STB, PSH, POP, STO and all the branch instructions. The fact that branch instructions have no effect on status flags means that branch instructions can follow one another in order to test for two different conditions.

The status flags affected depend on the instruction set in operation. In the 1801, at least, Lab = 42, showing which of the status flags are affected.

At this stage, of course,

Calculating backward branches

As you are aware when programming in BASIC, GOTOs can be to higher or lower line numbers. How do we calculate the operand number if we wish to branch backwards? The answer is that we resort to two's complement arithmetic. Relative addressing can be used with negative numbers in the operand to indicate a branch back to an earlier address. For example, if we wish to branch 7 bytes backwards, we must have an operand of -7. This is where our previous knowledge of two's complement arithmetic is brought into use. If you remembered that 1 of the 1801,

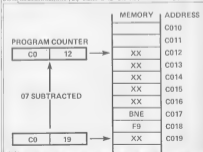


Fig. 42



Runecaster returns with
guidance on how to keep
your cool when lost in a
maze.

SENSE OF ADVENTURE

LAST MONTH WE LOOKED AT MOVING into adventure games, with how to map what we find. This is a really vital part of adventure gaming — unless you are one of those people with eidetic (photographic) memory.

To recap, look at figure 1. That is the sort of map you would expect to have after exploring the first few locations of a new game. Each box represents a discrete object or, at the least, between them show how those are linked together. Arrows signify the direction you may take to reach the location. Only one arrow would make movement in only one direction and the cross-bars ensure that no one (at the moment) exists in that direction. The loop to the east of the 'trap' never really shows that if you continue going east from this location — you end up at the same position! The technique is often used at the 'edge' of an adventure's known world.

Each box is labeled so that you will be able to relate it's position to the description seen on the screen. Items found — and I find obvious how found — are also recorded.

All this is fairly straightforward, providing you have a large enough piece of paper and keep your head (sometimes literally) how look at figure 2. Ouch, what a mess. One day of the game and you could find yourself in real trouble! What's worse, nearly all the parts are not very tidy. AND, what if all four locations had the same name? I could have labeled them ABCD just for the purpose of this article!

Just amazing

As you've surely guessed, you are in a form of maze. Directions, no longer necessarily follow the logic used elsewhere in the game. Going west, having just moved east, is not likely to get back to where you started! Figure 3 shows a four location maze but now you will find you walk to the 'bottom'. You can also find you may not be paid finding the chests! Lots of random, but this is welcome the whole way and a useful to help you solve the adventure. If then you, have wasted a number of valuable turns during which your food or lamp is running out — and of course the program is prepared to ask if it's then impossible to reach more food etc. Or it takes someone in the heart of the maze, is something vital to your well-being or vital to a successful conclusion in the future!

You have got to take up to the problem of mapping the maze. Maps seem to be an accepted part of most adventure games

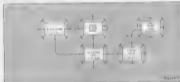


Figure 2

up to wherever you have reached at that time. Adventure games are very much written with the intention of a player writing down and solving them in one sitting! They are meant to provide you with data or works of paper that belong to your match a solution!

To use the SNAI (SNAI is fairly often — do not overstate a previous SNAI) all the time, otherwise you may find that the objects you now find are the objects you need — one of those previous SNAI may save you a lot of time! Using the form of movement approach is not cheating, it is part of the system by which you learn your way around.

Right — you may find yourself in a maze — so QUILTER (QAD) program SNAI and approach the maze carefully! Make sure you are carrying as many objects as the game permits — now when you enter the maze, drop something at location 'A'

Some people would say that they are unnecessary as they tend to be similar puzzles. But in the running of the program, you must see the players have got to solve for them to prove to what we are being asked to solve!

The 'original' type of maze is not so difficult to overcome and the last procedure used to solve it, may well solve the case of how you approach in every system. Truly, you must use a different form of 'mapping', something like figure 4 would produce a very 'messy' and symbolic map of the area explored.

Obviously you do not always know in advance that you are about to enter a maze! So it's immediately function here the need to make 'traps' Markings of your progress, nearly all of the better adventure games include the facility to SNAI your character's position



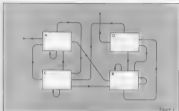


Figure 2

just use Fig. 2 at our MATH say "a wall". Instead of following our previous mapping technique we'll draw diagonals, and unconnected lines for each location.

Although the descriptions are the same, location "A" will also have a "wall" going around "B" in any direction — if you moved south you will return to location "A" and will see the wall, but if you go east you will come to another completely identical place — but without the wall! So photo something else . . . a cup, last time, and you are back to the cup, east, and yet another location . . . someplace here, fourth . . . lo and behold, back to where you stopped the wall!

Something extra, then it's a wall unique around you, this is a pretty dirty trick and certainly gets the arena in pumping, until you realize what's happening!

Once you have mapped your maze, you can either retrace your lines and/or everything up or QUIT, reLOAD and tried through carrying your previous you have contacts with you — just don't forget where you are!

Although this kind of maze is disappearing in favor of more complex mazes — it will prove that way to how to solve most if not all mazes. You have got to find a way to uniquely define each location.

Perhaps your maze is a mixture of the two above types — could just keep your cool and hope that there is a logical solution. "You are on a path to a forest", "You are on a path to a forest", "You are on a path to a forest" — how about (LARGE LILLY) or (SMALL PATH) you may well find a cut at one or a "solution".

Another device one is for your location to alter something you are already carrying — perhaps your sword (LILLY) or that long sword you have been holding (long, something when you see it — it showing different collections as you move around the maze!).

The plots and puzzles within mazes have for no means been wrong dry and a well thought, logical adventure-maze can still give tremendous satisfaction when solved.

Thorny subject

Much has been written about tape copy programs. We all know that one of their primary uses is to check the software houses out of their rightful dues. All of these want about this usage — but well, thousands of people just make a copy for a file and!

It is of course nearly impossible to stop Software Houses (as they like the problem in three ways: (1) endeavor to make their programs "unrecoverable" (2) the better or (3) increase the price to make up for losses.

If you want a good product it is almost certain that it will cost to produce. Other means of programmers have worked as different inputs — music, graphics, etc. — for months.

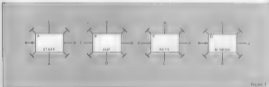


Figure 3

To be sure you have mapped the maze you must try every possible direction from each location. Having done this you will find yourself in a trap that will figure it. You need try every direction, program that is quite obvious enough to make the only "correct" "MATH" move in the whole game, that way can all the maze to somewhere's!

To have a maze such as the one must be able to carry enough objects to drop in different locations! If you think about it, you will realize that it is possible to solve a maze with one less object than there are locations. If only one place does not have

Take care

Sometimes the solution to a maze is staring you in the face — literally. Read the descriptions of all locations very carefully. "You are on a path to a forest" might not mean what it looks all around you! "You are on a path to a forest" might not mean what it looks all around you! It is easy enough to spot the difference in the two pictures and when these two descriptions follow one another in your screen — and you should notice the extra command (to a spare, or a full stop at the end of one of them).

Having said my piece, let us look at the other side of the coin. (1) it is useful to have your own back-up, in case of catastrophe and (2) although many adventure games are now on "Turbo Load" and it's really wanted, some take a long time to LOAD . . .

I recently got a copy of (MATH) back at my CMM as — provided by DOSSET of Blackpool. The utility requires a Hypercard copy of a standard LOAD routine to be made. Not all tapes will be unrecalled but I would really recommend having one to hand, on the off chance! (regardless) — that's all!



Need some help in compiling your Christmas list? Let our reviewers guide you through another jungle of Commodore software.

House of Usher

Atari
16/65
C128 64 • joystick

QUESTION: COULD YOU BE surprised by the fact of the House of Usher? Answer: Quite simply, yes. But it will take some time to do it's not that there's anything especially new to get used to or, indeed, anything especially subtle about it. No, it's just that there is a lot to get through. The richness of the game, however, is relatively novel, although perhaps diluted supporting in terms of material value. But as with the game, The support and the title itself of generations of mad Usher fans around a variety of something challenges. On entering the antediluvian home you are given a choice of nine rooms to enter in which each there is a game to play. As used alone guests go in a list to see that they are not up to much before to say, although they are all of them there a touch of the 'darken bang' about them all. However, Usher is a whole thing, and quite challenging because you have to successfully negotiate them all before you are allowed to enter a further two rooms to complete the game. Whether you live long enough to mastermind the fact of the House of Usher is another matter though.

R. N.

Immortal

Virgin Games
16/65
C128 64 • joystick

THE KITH HAS GOT A WHOLE CAT ON the Immortal attack and Red Legion, the head of the anti-immortal could his base given the task of putting a stop to it. The Immortal (I've chosen your name, prince, sirgent, captain or indeed and then such the Immortal have been given). Don't take too long before the longer you take the more points you lose. There is a lot to

SOFTWARE



SPOTLIGHT

Car Journey

Educational Software & Mail
16/65
C128 64

THIS IS A RECORDING ACADEMY educational package which deals with reading aspects of road transport.

The booklet starts with a brief history of roads, starting with the Ridgeway, a possible stone-age road, through Roman roads and Medieval to modern motorways. The rest part of the booklet deals accurately with the workings of a car. Further sub-headed with petrol consumption and the aspect of roads in Britain. An interesting diversion from motorways is a short section from the 'Birds in the fifties'.

(I read and enjoyed reading. If you didn't know, a booklet suggesting that the child read the rest of the book. Inside there are several games to play on the theme of car journeys. The booklet is very well thought out and presented.

The program supplied in the package involves to put on practice what has been said in the booklet. You play the role of a delivery man and must make money from your service by using your fuel, petrol and the most valuable efficiently. Candidates have to be made throughout the game. The graphics are simple but effective and can be used in further exercises suggested in the booklet as well as the main road to.

Overall the program appeared to be the winner



Section of the package, set used as a whole was a very good addition to any classroom.

442/8

the trouble you. To transport you, around the attack zone at speed, a hot engine has been placed in your disposal. You also have a petrol car and a fuel tank in your possession. The road and the river in the area. You transfer from one to another simply by pressing the allocated function key. You can use the helicopter to transport back the car and the boat to other parts of the game area. Points are scored for successful runs, runs and the attack locations and points are set for going in the wrong direction or not moving at all. But watch your fuel! As a closely, fuel can be transferred to

the boat and the car from the helicopter when it falls out. But the helicopter must take on more fuel. When the fuel drops below a certain level, the helicopter has three 'lives'. All engines under attack are destroyed by a shell burst and you must run to them immediately. When you get more the screen changes to show the area in more detail. Whenever all the Immortals will appear but you must get in the first shot. At the end of the battle the casualties are counted and the best or declared either side or in the story, I think. So do your good deed for the day. A great game.

R. N.



Boxsets

★★★★
 Released 2
 to 10
 EBM AG



YOU TITIME TO KNOW THAT at the end of a long and tedious play you can relax and rest assured that Borrah, the amazing beguiled leader from Dorsetshire has been banished from whence he came! Again from the fact that the previous edition was disappointing, an exciting reinforcement to be taken about the best part of the game which finally got Borrah out of the system. The object of the game is to get Borrah back to his "amazing, intangible, craft" avoiding a variety of obstacles, emerging from the right of the screen as a unit is from right to left. You'll be glad to know that there is a player tactic, although I managed to avoid completion throughout.

8, 54

Games

★★★★
 Management
 100%
 Data set - portable, reasonably

THEY SAY THAT OLD CASH IS the hard, well something like that I think. I am having real difficulty with this one. I don't like it. It's a boring game. The concept of the game is to manage the Power Jewels from a rather more realistic. When the diamonds above you will find yourself topped up, making loads, spins and the Groul.

You must, who needs it, a direct relation of a Pessimist. It's long, has to traverse four floors of it's structure to get to the Power Jewels. The only one you have are the diamonds in spring to stop on and the odd Power Jewel to get LOST.

standing, the absolute the Groul, who is surely deriding on you, disappears for a few seconds above you. To do this your last achievement.

If you do do, and I can assure you it's very likely, the Groul will get very pleased. But you must return to try and complete the level and move on to further levels. When you little Pessimist dies, the fourth and final screen the Groul disappears before you move and Pessimist jumps up and down.

The game also contains a text to be read out which includes a list of the sound effects. It's a very fast game as you have a time limit to complete each screen as there is a high score table and again, but not as well as the last loading system.

Bristles



Boxsets

★★★★
 Released
 100%
 EBM AG - portable

AT LAST A SOCIABLE computer game and a good one into the bargain. Bristles has a four player screen and gives each player the choice of having two players. And that's the object of the game. Simply to guard all the rooms in a variety of houses at 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100. There are no skill built to progress through and eight houses in each skill level. It's not really an easy task. It's not just a high score you're after either. On each skill level there is a hidden message which will appear in just after every house you complete the playing obstacle on. The message challenge is to discover all the messages. What, no objectives? Not quite. In fact there are quite a few. Each player starts the game with ten p's of diamonds and gets an extra two for each house passed and also bonus for each message made. There are lots to help you get from floor to floor but unless you take it right they are useless as you enter the quarters. There are also three letters located in the 10

rooms in the basement, but again unless you are out of the 10, 15, will appear you. But the major obstacles are the things that guard of guard which you have to jump over or sink under and the 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100. The barrier checker is highly intelligent and will chase you both sides in rooms. And there's more. Inside the first a series of rotating hand guards all over your body's painted walls and the only way to stop for a few minutes is to leave them. There are also the items in the room to watch out for which are hidden. It's occasionally possible through the floor of some rooms. Oh, I almost forgot, sometimes you are paired up with other players and at some times you are paired in the room. Get off pairing and defeating a ball. I'm not surprised but definitely give it a go before you get so complacent.

8, 54

Ant Attack

★★★★
 Released
 100%
 EBM AG - portable

THEY SAY THAT OLD CASH IS a great success on the Spectrum has now been converted for the 64. At the time of it's original release, there was great acclaim for the unusual use of the 10 effects. To say it's the effort on the 64 are also very good after I got quite as impressed as the Spectrum version.

When you start the board up on the cassette tape, the first is a totally simple. You control a small figure and attempt to locate unfortunate segments about the diamond city. At first, the buildings of the city are represented as blocks and you get a new perspective on view of part of the city. As you move about, the scene starts to gradually showing more of the area. By pressing any of the buttons, you can choose one of four views of the area. The main problem is that the city is occupied with large quantities of ants which have the same value of killing our hero. To make

death, you can either try to eat them, climb on a building or throw one of your last 10 supply of grenades.

When you encounter one of the last ants, there is a really hard combat and, if you don't run too fast, follow you to safety. You must be careful, however, as you can kill yourself and the ant and victory.

The graphics are superbly simple consisting of grey blocks with a few shades of grey to give perspective. The movement of the little man is accurate as much as that of the ants. The buildings are represented as a series of blocks. The use of sound on the other hand, was weak.

Overall, while the visual effect is limited, I found the play rather boring. After the first half hour, I found myself already in doing that something new would happen.

8, 54

SOFTWARE SPOTLIGHT



High Noon

A.A.A.
Olympic Software
£1.99
Cassette • joystick

DO YOU HAVEN'T WON KILLER AS A bit of a cowboy do you? Come to help out your wild west friends! Anyway, here's your chance. High Noon turns here, it on this machine would be provide a real little game plot. Sometimes in you are the good guy on the screen and, armed with your gun, it is your responsibility to keep the peace in a township, or better known town. You are up against a desperate gang of bandits, some are stealing things from the bank and they are from the station. They'll come on horseback and on foot and armed with dynamite or will even be gunned, whatever it is it is bound to lead to a shoot out on main street. To prevent the loss of your home peace, you have to keep the gang and the law side on shoot first and ask questions later and remember, they won't shoot when there is a chance at shooting each other. The

township. Of course there are a number of screens to progress through each of which is a new stage of difficulty. Eventually, if you're good enough, you will walk off in the town and will where you will be faced with the big showdown. That's about all about you escape the shadow of the outlawed Underminer. Right about.

R.S.M.



Secret Agent

A.A.A.
Burmester Software & Sales
New Colours Ltd
£4.95
Cassette • d

HERE IS AN EDUCATIONAL game with a difference. It comes in a package of cassette and book. The cassette deals with real-life spies and those from fiction. After reading about spies, the reader is given pictures to try, either writing a spy story or doing further research. To be a successful spy you will need to understand about ciphers and spy language and it's almost necessary. The booklet gives information about all these aspects and suggests extra activities, making done the background work from the booklet, the game puts theory into practice.

Your aim in the game is to capture an enemy agent who is travelling about Europe killing off your resident agents. You have secondary arms in that you try to operate as fast as possible and to keep your down. Had to keep to your

budget and to operate quickly and you will end up gun-pushing behind a desk. A highly engaging end for a secret agent!

During the game your agents use secret intelligence reports going over to the information of the enemy. Some of these reports have the added of the ability of being in code. You can get help from headquarters to decode the message but it costs extra money, so do messages from intelligence. Before you think you know where the enemy is, you can also up a time table of lights and that is out of town and to given ones. You can then travel to a city where you reach the is and, with luck, capture him.

This is a very good package in that it brings together all aspects of education. These include geography, history, the need to perform simple decoding and even the aim to use the 24 hour clock.

In all, this is an excellent package which can be used as a way to spread new information, or can be specially expanded to a game for use at school.

R.S.M.

Cybertron Mission

A.A.A.
Microcomputer
£4.95
£19.95 • joystick, optional

game, Spyness, Clones, Cybertron and a ghost of a player past. The difference between this one and other games is the task you have to perform.

In this game the player is told what mission he has to perform and put on the spot. On the first level is the mission on the spot of a task and up to it. Most point out that you have to perform a level there is this agent's mission. It only takes a second or so but it's great. Anyway, there are 16 missions on each level to explore while looking for the treasure, an indicator on the top right-hand corner

indicates which room and what level you are on.

I mentioned earlier the existence of a ghost. He cannot be killed but he can be stunned. Obviously as you travel through each level the spots, when stunned, will stay on for a long period. The game has reasonable graphics with good sound accompaniment. It has a good facility and a high score table. I would have preferred the graphics and the tale in a different colour as they are occasionally hard to find.

R.S.M.

THIS IS YET ANOTHER COPY OF YET another successful game for the Atari. This is a copy of a game called Shamus in which you have to run through rooms searching for treasure while avoiding a cat, a dog, or as they are called in this



Bulldozin' Patrol 2

★★★★
Simon Gurnett
10/90
1-800-451-5426

YOU HAVE CAPTAIN THE upper hand in the war with your deadly armor and it seems to be your VTOL that has done the trick, but now the enemy is about to launch a last ditch attack to win the war and it is up to you to prevent them

from succeeding. For the battle, your VTOL has been armed with both air-to-air and air-to-ground missiles. A tough your VTOL is noisy and highly maneuverable, it requires careful handling. This can't just turn around and chase the enemy, you have to shoot down first and then move in. No pathfinder either although they have no VTOLs

they have these types of helicopters transport which drop their batteries and radar sensors, gunships which can shoot you down, and sales designed to lure you into making mistakes. A radar display at the bottom of the screen will indicate the enemy's position unless radar sensors have been dropped. Fully loaded and fully armed

the VTOL starts 100 miles in but you are forced to avoid to last an more weapons and fuel during the course of the game. How do this by landing on the numerous landed enemy pads which means immediately 75% are destroyed. For those are targets of this flow are considered and the game knows it. To become airborne you'll never miss it through the obstacles.



Magic Micro Mission

★★★★
Quadrant
10/90
1-800-451-5426

THIS GAME OFFERS TWO GAMES of different but complementary styles. The first game involves periodic 3D movement efforts to save, are the way forward from the cockpit of a spaceship. The idea of the game is to shoot approaching enemies before they reach you. You have a cross hair sight to aim your aim. The graphics and color are very nice but the whole action was appealingly uninteresting.

The second game is a maze type and, much to my surprise, was worse than the first. You started a robot and must move about a maze endeavoring to catch various BOMs (Blast Only Monsters). Your movement is impeded by parading enemies and BOMs. If you get into trouble you can double the explosion but you lose 5000 points. Since scoring was low, I didn't share the option available very often. Consequently this segment was only just average.

Overall, I found the package was and really not any better than average.

A.E.W.



Bulldozing

★★★★
Blue Wave Software & Bill MacCollum
10/90
1-800-451-5426

USING THE WORDS OF THE accompanying booklet, "Bulldozing is an accurate simulation of a hot as bulldozer". It isn't there to amuse but the point too long that it was necessary to bulldoze them using the whole point of the game. You should be observing the work going your advance and feel etc. You start off at flying school learning how to fly and land your bulldozer. Following this, when you think you are ready, you take your flying test and hopefully pass your flight. What if you wish to do it all over to work, you can keep a record of your last test, and your flight, and by making a duplicate I got. The booklet accompanying the cassette suggests alternative games which you can play using the package.

The booklet covers many aspects of bulldozing and bulldozing starting with their history through to the scientific principles of their flight. Suggestions for further research are provided so that the topic can be extended as far as you want. An important aspect of flying is the fly to read maps and estimate the effects of wind. Again this aspect is discussed in the booklet.

The display gives a nice view of your hot on moving against the terrain. Along the bottom of the screen are instrument dash showing a radio, rate of climb, fuel and temperature. Overall a reasonable package although the program seemed a little slow and tedious.

M.L.M.



Phase 4

★★★★
Channell
10/90
1-800-451-5426

NO CONNECTION TO THE famous, loaded with this amazing game. It is a right on the edge of the world with the aid of different levels that killed video gaming as a past sport. No wonder had you put your title in the slot when the game was over. There are ten or so different types of alien each to keep track of which are being a you at the same time and all of which have a different value in terms of points. Take the first alien for example. It looks like you're destroying the system and not only do the alien fly across the screen usually dropping tons on but there's one that doesn't hit you at all. And, so it's worth a highly numerical background it's hard to tell what's anything it, let alone avoid it. Ten straight forward then, without making a shot possible, pushes you into the next screen where you have a quick change into a more horizontal aspect before moving back to screen and a target at an even more interesting background. What else can I say? So, having played the game and written about it, I can't quite make up my mind whether it's good or bad. One thing is for sure. It's extremely hard to play and lose so quickly.

E.M.

Keywords: child sexual abuse; disclosure; self-blame

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

It is a GREAT FEELING TO receive a game in which you do not chase anyone, are not chased by wored and merciless characters as free space of peaceful movement. This game is one of these but is so simple to become addictive and challenging.

You say that Council Member in the game of a little blue blip? You follow brothers have been captured by the wind and his headman and your task is to capture them from his castle. The old look away, on the matter of two and a half weeks trying to distinguish you from your own. However, you can take these birds to your advantage by using a living track to propel a stationary new from road side-up in the same manner as you can take it.

carve (principle of moments and all that). You can get these proposed rules and, as in last, dislodge the cat's paw from the wall. And the battlements of Catholicism. Heretics and you can get a more pragmatic cut the circle with without harm.

grabbed. The lord and his henchmen are cowardly and made you are in the castle they fear crawling you to rescue your horses.

On the next level, some of the boys are having their affairs. This is a bit of a task, more difficult than I am not to progress forward level 2. I guess someone can have those married boys more.

Approach the game a little but not, uh, overdo giving a cartoon like me. The comic effects are certainly different, the music between reading lot of poems, and a rather hard to hear of the what I mean. If not, try it I should add that the poems are in words. By the Andrews notes people, any time and give people the much.

This is a game of density and strategy, which, if you are seeking that crucial experience, is the way to go.

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SOFTWARE

SPOTLIGHT

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

100 100 100 100 100
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PLAY BOLDED CRASH! Intoxicated, ready and willing to be tossed through the gears or smash all gears. He has collected the indicated amount of growth before the explosion, due to the fact I've resisted on the screen. Or, maybe you might not see it at once because the glider has a fairly long brooding, or even a long brooding, before it can be used. The fact, however, which does not give the picture that is accurate in words of the growth. Although they drop and made enough, then will make a tasty strawberry jam out of Rockford. Apart from the explosion, there are the growing antibodies to blood, teeth, to look at associated with the growth. The growth is not the same but a few crystals of the antibodies and the game. There are water cases, suggestive to each point in the growth and the play, but for each case. And there is a bonus. No, no, there is a hundred points you score with in the board, three of great use Rockford with the game with. With's more, for me.

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Strontium Dog and the Death Council

[illegible]

If it **DOES** ACCELERATE AFTER THE RACE, the game must have one of the largest fields at the market. Above the market on the Brooklyn Dog is really a mascot called Johnny Alpha (don't the authors read Harry Harrison?). He is known on the trail of a couple of neopagan practices called the New Recovery. The action takes place on the Planet of the Harringtons where you find falling this down in nature's land. Finally, the man of the moment must cross the planet showing

[illegible][illegible]

Graphically the game is very nicely done with potential use of some shortcuts. Similarly the use of sound is effective and suits the scenario perfectly. Along the bottom of the screen is an overall view of the planet showing your progress.

OK, how does it play? Well, at one level it doesn't present a significant challenge and soon becomes rather boring. This is aggravated by the fact that completing one level usually puts you back at the start of the next level in fact, after completing the last screen, I got the message to load "gameover.exe".

Time Zone

Channel 5
\$29.95
CIBS Ltd

TIME ZONE PLAYS ON THEM straightforward, honest, good-time rapping game with a



playing zone which swirls from right to left. You are the pilot of combat craft Alpha, saving the evil terrain out of the galaxy. The program is recognizing them when you see them because they are a rare of shape character. Their shape depends on the time zone in which they choose to appear in the 240 seconds they attack as helicopters, U.S. jets, cruise missiles and tanks. It's the most real me as action, action, and winged. Hours. Classically they are traps and pyramids and in the pro. Program and interesting, states and volcanoes. Properly they are distant and teamed space craft. The side view of the game also shows them page and for all the, every time you clear all five waves, the difficulty level of the game will automatically increase. Can you win you, then well add level if you can't in who saves.

R. H.

Chiller

Mastertronic
\$19.95
CIBS Ltd - Level 1 (optional)

you're didn't the VIDEO you'll see the making of the video, and you've heard the single how play the game. You can also be a somewhat with Mastertronic. Chiller I was when I saw the package, very good at the game. But now I've played it, I found out to my top twenty favorites of a time.

I think the best way to describe it is as a high-resolution, graphic machine-adequate adventure of that possibility. The last it seems to remove your get through from a house of the dead and get back to the car. The problem is that you have to get through the screens of zombies, collecting the magic cross.

Once you get to her you then have to get back (with her) to the car. Both you and the girl have to go and the screen. The last for you and the end for her.

Both characters are played with the same symbol by pressing the two buttons and the support of 16 numbers to the other character. The graphics are superb and the sound is very good.

M. J. P.



Punctuation Pals Wordfinder

Barnes Software & H&R
Mastertronic
\$19.95
\$19.95

DID YOU KNOW THAT "London" is a Celtic name meaning "the place of waters" or that "Toadery" is Welsh meaning stone turn or hat "Chorus" comes from Greek meaning Roman lord. All these snippets come from the Punctuation Pals Wordfinder. This is one of a series of educational packages comprising a parent and teacher. The booklet contains and lots of follow-up exercises, all in song, in words and rhyme.

The first part of the booklet shows story writing. Children are asked to illustrate the start of a story followed by a cartoon picture for the next section. You are then invited to complete the story and pictures. There are other sections covering dialogue writing and a series of word games, crosswords, anagrams

and code breaking.

The cassette contains two programs. The first, Punctuation Pals, comes with three difficulty levels and gives a message for the child to correct. The booklet is used to record it. One at the end of the book, stopping to allow the child to choose what to do. When the package is finished, the child will mark the work and it is correct. He will record the child by jumping and moving. The booklet used a large French school type font, which was both attractive and easy to read. The use of animation was smooth and it is.

On the reverse of the tape was a Thesaurus which carried a dictionary of about 1000 words through which the child could discover the relationship between words and the concept of the simile. These words were used in hangman and anagram games.

Overall this is a good package which makes learning in language fun. It is a very thing to buy and it is not for just school the classroom at home.

M. J. P.



Tells It The Factory

Mastertronic
\$19.95
CIBS Ltd - Level 1 (optional)

IT'S ANOTHER VALENT attempt at emulating the game of Apple Panic. It is a variation on a theme with an expanding new task, but it's still basically a ladder game. The idea of the game is to keep the generator, at the bottom of the screen, running. This is accomplished by running up the ladders and jostling the oil can. When you have returned to the generator and it is set up, the can is tapped and you

have to start again.

What you are innocently manipulating the machinery the generator is trying to knock you off the platform which you have to traverse to get the oil can. As by using the paddles, which it on end of the platform, you try to knock them off the floor. A counter shows time, a car occasionally starts a dash across the platform. If you are lucky, enough to have the bag of powder with you and you drop it in front of the car, not get a extra points for killing it.

However, at the bottom of the screen the generator is getting low on oil and, when you run or carry one thing at a time, it's a race to the car again. One thing to be careful of is the conveyor belt at the bottom on which you have to run because, if no moving on the belt are numerous packages which you have to jump over. If you get knocked off or knocked over, you can't take a life. The sound isn't much to write home about but the graphics are pretty.

M. J. P.

Cuthbert enters the Tomb of Doom

Reviewed
by Tim
Latham - Ipswich

AFTER PRODUCING A HUGE
volume of Dragon software,

interested use now sees the
Cord 84 market. The program
continues the theme set up in the
Dragon by featuring Cuthbert,
an overweight silhouette in the
a taste for adventure. As clearly
suggested by the title, this
game is a graphical adventure
set in a maze of convoluted
rooms. (I believe that there are
in excess of 300 of them!)
During his travels, Cuthbert

must collect a number of
things. First, keys are necessary
to open doors barring his
route. There are lanterns, rings,
golden apples and gems which
yield points. All of these items
are found in rooms on the way.

Four mazes are impeded in
a number of ways. There are
sandily mazes which appear as
the rooms and will kill you
given a chance. You sink, of
course, almost with a loop with
which the mazes can be lost
the air between doors is
limited and gradually
decreases with time. You hear
therefore progression in an
doors regularly before an exit
out. There is one other method
of progression, to lead your
movement through some
rooms, there are water
transporters. You have three
coloured lamps which can be
used in rooms of the
corresponding colour. If you

lamp is lit, you can freeze the
enemy, once you must then
wait the lamp for scoring
points. Lifting a lamp also lights
up letters in the word
LATACADMI written at the top
of the screen. When all of the
letters are lit up, you get
progressive.

Overall this is a well
conceived game with tactical
graphics and a plot rather
trivial so and that's. Certain of
the rooms are designed so that
turning and taking must be
adopted to collect treasure or
open doors. As with many
games, the actual system for
to move is fixed and can be
replayed given time. You can,
however, vary many of the
game parameters to increase
the difficulty of the game. My
best is room 311 and that leaves
me leaving solutions. In all, a
nice one.

A.L.M.



Summer Games

Reviewed
by Tim Latham - Ipswich

I HAVE JUST WENT A VIBRANT
coloured attention win-
ning thing, pole vaulting,
javelin, ice, running and shoot
thopping and all without
losing the comfort of my
computer corner Quicksilver's
new game jumps in the
Olympic landscape and does
it very well. The program starts
with the opening ceremony.
The flame is lit and doors are
set loose to fly across the
screen. You are then invited to
enter your name and choose
the country you represent. An
athletic set to four seasons
events will be played if you
wish. Up to 16 players can
participate. You can then elect
to either try a single event or
partake in all. If you wish you
can even practice any events
you choose.

In the doing you have fast
doors and you can vary the drive
(and turn) by the main
simulation of the joystick. Next is
the pole vault which needs a
lot of strategy and timing to
clear the bar. The next events
are the 400 metre relay and the



100 metre dash. Both races are
against the clock as are the two
swimming races.

The games are great
fun and if you do not have
I tried a couple the games and
found it best to play on a screen.
The most difficult of all is the
shot put, probably because
it isn't the most used race. You
have to shoot either single or
double darts from several
positions. The simulation was
most accurate and even
included the effects of shot
sails.

The graphics in this game
are of a very high standard with
detailed high resolution
backgrounds and excellently
animated sprites. Overall this is
an excellent program and is
probably the best Olympic
program available.

A.L.M.

Swamp

Reviewed
by Tim Latham - Ipswich

CAN EVER BE TRUE? I'M SURE
I CAN! I think it is, this folks.
It's Swamp time again.
Swamp is yet another evolution
of that old game which people
just want to get. The difference
between the new and others is
that if a Golem, sorry, Space
is, sure you put you it up as
expensive egg in your
which means if you touch it
you know you if you don't you
know you're wrong and get
blown up instead.

At 100 progress through
the levels the Golems, the
space vehicles get more
techniques and it does require a
lot of agility on the higher
levels. Yet again, the music in
this Micro-power playing is
surrounding and a nice
graphics touch has been
added. The stars in the
background move at constant
rates, giving an impression of
depth and when your orb
explodes the debris scatters
in a wide arc.

The game has different dif-
ficulties and a high score list.
There is also a power bonus for
all answers it's not a bad copy
of Swamp, sorry, Golem.

A.L.M.

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Games

A large assortment of 64 cassette and cartridge

Exploit the graphics capabilities of the Commodore 64 with the right tools. Simon Palmer and David Crisp review two graphic aids currently available.

DRAWN TOGETHER

Kaala Pad Touch Tablet
Kaala Technologies Corporation
CPLN

Commodore is **1184000** EQUALLY COME from Russia, but this one is definitely American, being an art package of a high class. It comes from the Kaala Technologies Corporation, the software is written by Aldo Light UK and distribution is in the care of Autodesk.

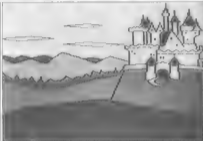
"Kaala Pad" Touch Tablet.

Assuredly packaged in a bright red box, Kaala's touch tablet comes complete with operating instructions for the software and touch tablet, plus a stylus for drawing on the touch tablet.

Readers might find useful the following list of key features of how a basic touch tablet works. Imagine two sets of wires running horizontally and vertically across the tablet and connected between the horizontal and vertical wires (x and y coordinates) in one form or another. These are then translated into signals which can be understood by the computer.

The software, which is supplied in a small box or tape or disc and, as usual, it took a long time to load. In the first interval I took the opportunity to flick through the manual and immediately observed that it was a very good one. It was a very good one for the Commodore 64 system, but just an hour for the user to learn. However, since the Kaala tablet is so easy to use the manual is a good one and so on.

The Kaala pad itself is made of a very strong plastic, and a glass into which Part 1. A long cable is attached to the operation and therefore greater comfort it uses two



regions to put the stylus to draw information from the pad. For example, here is a simple little mouse which changes the colour of the cursor as the stylus is moved around the touchpad -

10 A-PILLER 1000 6-1000
10000
10 10000 1000 1000 1000
10000

It is a very effective application on a small screen. Another application on a small screen is the creation of a new manual statement by using two different working areas on the MD chip. However, I am drawing from the manual that it is a very good one - it is so easy to use in these few minutes for a year.

Kaala Painter

In conjunction with the Kaala Pad, the Kaala Painter software is a new word for the user who wants to create high-level graphics with relative ease.

Well-known pre-defined pictures such as from reality to reality, from point to point to point to point. This means a lot of time means a direct comparison to the Kaala Graphics machine, but for any of 100, it is a good value for money.

Once loaded, the machine displays the graphic menu. It is divided into three sections: commands which then when activated, display, under which relevant items a small black screen, color palette on which 16 different colors are displayed, together with a further 16 pre-defined colors below them.

There are 17 different commands, all which it applies to graphics. The remaining 5 are functions for drawing the total picture, saving or loading a picture, and saving the last picture made.

When you enter the program menu you can select either type of drawing for your machine. This facility is so valuable you can select a new disc without

reloading the program. The "Disc" command is very useful indeed, because it is almost certain that at some time when you are using the program, a mistake will be made. This command will remove the last picture or 'file' made on the program, making you to start it again. The first command simply removes the picture on the first screen, leaving it ready for another classic masterpiece.

The 16 graphics commands enable you to simply draw or redraw a picture on colour or black and white commands as well. A selection of the commands which I must mention are "COPY" (American spelling, not copy) which will change a picture to colour or black and white. In considering the new color command and then placing the color pointer over the target color.

The next command is a bit "boring". It is simply to set the screen into quarters and rows



whenever it seems to enter action into the others, not for one. However, if after comparing a couple of pictures, you want to transfer a particular object which you have created to another spot on the picture, the "Move" command will not suffice as the object is questioned as already on the screen, this is where the "Copy" command comes into it's own.

Koski's "Copy" command reproduces the desired graphic and, without a square around the particular object you're after, it's so reproducible the graphics on the complexity of the command's action through the use could be made more useful to which I picked up which playing around with the version, this involves the use of another command called "Swap". Basically what this command does is to transfer the cure from the screen to a second screen.

Found that, by transferring the graphic, I decided to Copy to the second screen, and then by using the "Swap" command in the same window as the background, I could eliminate the peripheral graphic but remain, and then transfer it

back to the original screen.

Finally, in the command section I decided to use how accurate the "B" command was. The manual says that it can split into other parts of the picture if the graphics are not completely enclosed. This is logical but attention is drawn to the fact that you can't pass it to an area and a background colour in a given space.

With this information around, I started to play with the "B" command. It is more efficient but colour-colour swaps occur when more than the stipulated number of colours are used. I feel that this is a minor drawback to the limitations of the software, but possibly this computer will handle the more complex and various of the expanding user (Oh, even the IBM 486 cannot do everything).

Brushing up

This package contains more brushes than Rosi's Home's paint box. Interestingly, though, its brushes are applied in the Koski Painter from a right-click to the line, or even a wide thick brush. So, in comparison

with some of the commands such as "Frame" you get some very pleasant designs to play with instead of getting a single box on the screen you get five or, if you wish, by using the "Draw" command, you can basically copy most graphics on the screen. All in all, it does not run fast enough to calculate a normal window speed but, at medium pace, it will give a fair representation. This is a good step of discovering how fast a package runs, and how accurate it can draw.

But now move on to an important part of the software — the "Colour Palette". It is most interesting to see how the colour has been designed. There are 16 solid colours and 16 patterned colours from which to choose. If, for example, you wanted to have a patterned colour (stippled or red and blue), you would move the pointer over the red and blue squares and press the button on the pad. The border of the screen turns red and the patterned colours all use colour red as one of the two colours. You then simply move the pointer over the desired patterned colour which appears under the blue colour.

You can save part of the patterned colours, or more frequently it would be used to fill a window of the screen. There is an arrow marker at the top of the Colour Palette which indicates the type of colour being used — either solid or patterned, this results not in a better use of the wrong type and have to revert to the "Copy" command. In theory, since you have available 16 solid and 16 patterned colours, 256 combinations are achievable.

Pictures outside the program

It is most likely that, if you create a good picture yourself, like a friend, want an exhibition for family and friends to admire your skill. If you want to show it without all the fuss of loading the art program. We I, have had the foresight to put a program in the manual which will enable you to load the picture file without using the Koski Painter. You may have already noticed that I said "dot" and not "page" as well I would have thought that save

most computer owners at present have only screens and not a lot, it would be more advantageous to include a type version of the program. As I said earlier, the manual is written for die users and not the casual-to-pop user. But even so, the fact means that it is an advertisement for the Commodore 64, and you could design the graphics for your latest advertisement, and by using the program in the manual, display them on the dot.

Now, throughout this article, I have not mentioned anything about example graphs, screens, the manual, and all the other bits of paper coming with the Koda Pad do not move on any more systems to, obviously, there aren't any. Money — there is a picture contained in the paper describing the program itself. This depicts a single screen and is quite good. To who did they not say something about it in the manual? I don't know — people are funny!

To conclude

Although this is not the only package available for graphics, considering all factors, prices and features at £60 or thereabouts it is a very good value for money with a formidable array of commands and facilities summarized as follows:

DBASE, DRAW, CIRCLE, ADOBE, MIRROR, LINE, BOLD, DASH, COPY, WAP, UNDO, BATS, HIL, GROUP, STORAGE, COPY, MAKE, B BROWSE.
% Color + % Pattern (26 Combinations)
M.F.P.

DESIGNER 64 Graphic Software COM-64

Commodore 64
QUINTON THE MAMELAL
Designer 64 is a design and layout application program which incorporates a screen character layout editor and a program generator.

As all Commodore 64 users know, this computer is capable of tremendous graphics with the right software. A lot of potential for good but simple graphics are built in via the keyboard but, if you know how, then greater things are possible.

I happened to be able to tap some of the 64's true potential from the point of interest, especially concerning the much desired Commodore 64 screen logo. It is possible that the product I received was premature as it came to me in a plastic bag with a label indicating what it was. The manual is substantial (40 pages) of considerable thickness and very clear and easy to read.

Aims and ambitions

With this program it was my intention to long out some rather more sophisticated pages, to some of the programs I use in Asia, I was going to lay out some day-to-day diary pages. I had success on the second job but not the first. Read on and I shall explain why.

My copy came with a second set which had a few demographical pictures created with the software. The most interesting part of the package was that after a design had been created, the program could translate what you had

into a BASIC program, and that the BASIC listing could then be used in your own programs. To help achieve this, a merge routine could be used outside the program but, I must point out that it would have nothing to do with graphs and spots as it is just a listing. However, and within the control of Designer 64 is a perfectly adequate.

Using these facilities, I designed my diary page and saved it to disk. I then wrote a line lot of BASIC around the program using the date and the day of the week and, after four busy days, I printed a prototype. After inspecting this information, it was, I felt, out of a diary which I often use. It is cheaper than a diary and, of course, I can have as many changes as I choose. A last of application but hardly one to stretch a program to its limits.

Undeveloped

The idea is to choose a shape when you have chosen the shape program, which must be a letter, number or graphics key, you then manipulate the shape. You can magnify, reduce, rotate and rotate it around the screen, fill the page with it and so on. The most important thing to note is that you are limited to the pre-defined Commodore key shapes. To my mind this was hardly adequate. It was not possible to draw line-things like a circle or plotting a line of the various characters, an absence of movement such as circle, etc. meant that it was difficult to make anything look better than "funny", for want of

a better word. I can achieve about the same effect by clearing the screen, placing the characters I want to make the desired picture on the screen, putting a line number, cursor mark and a space mark at the extreme left edge of the screen and pressing return. Repeat this screen on screen and you then have your design at program zero. Most important of all is each nothing!

Achieving a degree of automation is possible with Designer 64 but nothing that could not be done fairly simply through BASIC anyway. All this software costs a tidy sum of graphics capabilities of the 64.

In lower level, best use of the 64's graphics is to use a program you can choose from, program on screen, change colors and turn it into a finished sub-screen. Deep reading of the manual reveals that almost half of it is not concerned with actually using the graphics but with other aspects and glossaries.

Manual parties this was not an easy program to use and there was much to be remembered. Use of the keyboard and function keys was good though, and it seemed possible to get logical it was possible to get good-looking designs using a Commodore printer. But there was absolutely no help given in the manual for the many people who use non-Commodore machines. If you want screen design from any of the more popular day-to-day programs you would have to write out your own way of doing it.

More potential

Designer 64 is not an expensive program compared to some but it is certainly not in the present money market. So far, however, I don't think I would buy it unless I had a very specific use for it in two ways. I must stress that it is very obviously a low-resolution on drawing a line and therefore, even a lot of potential. I get the feeling that it is a wasted opportunity and that the cost is too much more it would be possible to get far more sophisticated design packages. Look closely at it before you buy as I feel that you may not be getting quite what you expect. To be fair though, it shows what it does very well and, if its design potential is adequate for what you want, then it is an excellent product and should make things a lot easier.




























M.F.P.



One of the most common queries received by 'Your Commodore' concerns the symbols found in the program listings. We hope the following information might help you.

64 SYMBOLS

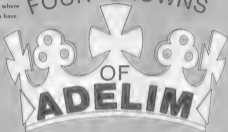
THE 64 ALLOWS YOU TO easily control how, via, or print statements so that these functions can be executed within a program. For example, it is possible to position the cursor on clear the screen using the relative symbol with the quotation marks. The following I show the symbols and the text that generate them. Don't forget the quotes!

	↑	GND		↓			→	CLR LIT
	←	R, L		↖			↗	CLR & R/L
	↙	Y/L		↘			+	CLR & RHT
	■	YVS ON		└			X	CLR & R/D
	┐	R/L-RTT		┌	CLASH COAR		○	CLR & C/L
	├			┤	CURSOR LP		⋈	CLR & P/L
	┤			└	CURSOR & L/R		┃	CLR & C/R
	┐			┃	CURSOR L/T		☼	CLR & B/L
	┃			┃	ASORT		+	CLR & T/L



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thus succeed where
lesser mortals have
failed.

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One quarter alone, with courage and determination, might succeed where others have failed and you that succeed!

Instructions

In screen 1, I have used all characters in this matter in order to mirror the collision detection test, of course, the character receiving trade to play. However, from screen 2 onwards, it's special all the way — all 8 spaces in machine code, plus last screen screen scrolling on screen 4.

Screen 1

Seven ahead, underfoot, no entry all the way, no entry, but don't let anything else. When you have got all the

cheats, a key will appear. Pick up the key and the predecessor will appear, and show you the screen 2.

Insert controls in port 2, move up/down, etc.

Screen 2

Jump the creature and leave to get the crown.

Left = walk, etc.; Right = walk right; Forward and fire button = jump.

Screen 3

Check the trade walk, avoiding the falling, rotating blades.

Left = left; Right = right.

Screen 4

Run the gauntlet, avoid the enemy soldiers and regain the crown.

Forward = up; Back = down.

Screen 5

Map on and off floating platform.

Left = left; Right = right.

200		Download L D C
20	— 448	Get position
600	— 160	Move data
1000	— 1000	Move up/down, etc.
2000	— 4000	Download data
4000	— 10000	Download data
6000	— 10000	Download data

200		Download L D C
20	— 100	Get position
1000	— 1000	Move data
2000	— 1000	Move data
3000	— 1000	Move data
4000	— 1000	Move data
5000	— 1000	Move data
6000	— 1000	Move data
7000	— 1000	Move data
8000	— 1000	Move data
9000	— 1000	Move data
10000	— 10000	Move data
11000	— 10000	Move data
12000	— 10000	Move data
13000	— 10000	Move data
14000	— 10000	Move data
15000	— 10000	Move data
16000	— 10000	Move data
17000	— 10000	Move data
18000	— 10000	Move data
19000	— 10000	Move data

200		Download L D C
20	— 100	Get position
1000	— 1000	Move data
2000	— 1000	Move data
3000	— 1000	Move data
4000	— 1000	Move data
5000	— 1000	Move data
6000	— 1000	Move data
7000	— 1000	Move data
8000	— 1000	Move data
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13000	— 10000	Move data
14000	— 10000	Move data
15000	— 10000	Move data
16000	— 10000	Move data
17000	— 10000	Move data
18000	— 10000	Move data
19000	— 10000	Move data

[illegible]

Programa de Pós-graduação em Física



[illegible]



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programs to disc.

DOING IT YOURSELF

If you have been following this series, then by now you should have nearly finished programs to enter data and present it in a neat fashion. To store this data on a hard disk drive. Of course, you may wish to use a sequential recorder to store data on, but this is not to be recommended for several reasons. First, and most obviously, it comes at a considerable cost—especially if you can practically only store data in a sequential format and so to read one particular record, you will always have to start at the first record and scan through the file, thereby you cannot update one record without reentering the complete file and so the only practical way to use a cassette is to read the complete file into the computer at the start of the program and to enter it all back at the end of the program, doing this is effectively like the amount of data you can store

Sequential disc files

Sequential files on disc have the same problems as sequential files on tape but are faster. There are good reasons for doing them though—for example you may require a transaction list of some sort and would never need to look at a single record so a sequential file would be suitable. To make this clearer, say you were writing a program to take care of your record collection. You would have a list of record names together with details about these records and you would want to access an individual record in a sequential file (which is not to be suitable). However, if you wanted to know where all your records are (say you have lent them to a friend and then every time you tell your program you have lent a record out, it would make an entry on the transaction file. Every record returned would also have an



entry on this file and each new entry would be added to the end of the file. When you come to list this file you will simply read it from the start and print out every entry. Reading a sequential file from start to finish is faster than doing the same with relative files (see below) and sequential files are easier to manage.

Most of you reading this article will be using a 1940 disc drive and if you are then you must be aware that it has a flag which can easily be lost and must be avoided. When processing a directory entry using the 'all' command, the file may become corrupt. This applies to programs that use sequential files. To avoid this, always use the search, remove and save facilities.

Search filename + "bak"
Remove + delete to filename
+ "bak"
Save filename

You will notice that there are no BASIC commands but just general guidelines to the saving of files. Another advantage of doing it this way is

that you end up with a back-up version of the file being saved.

Relative files

We have this can cook coffee, and change to use at first but are in fact a very good way to store data growing purely at randomly. If you are using a machine with BASIC 4.0 instructions then the following comments will be of no interest although they will still work. For the rest of us with BASIC 2.0 as on the VIC 20 or the C64 64s, we need to do a table the address and commands once and store them as variables. Having done this they will become simple to use. The end result of using a relative file is that every time you update a record, in a way, immediately written back to the disc which means that during the program and ending the program does not involve lengthy waits while data is being read in or written back. This also means that we can store an unlimited amount of data (you can have to buy another or a bigger disc drive if you run out of space).

To explain the principles of a relative file, turn a glass sheet of paper and down the left hand side from top to bottom write down the integers 1 to 28. Each of these integers represents a record. The blank space to the right of the listed integers is the data that is stored in this record. If we select a record, say number 1, then we can immediately go to record number 1 and start writing data on it. We carry on writing to it until we reach the far edge of the paper where we run out of room. The amount of data we have now written represents the record length. We can do this in every record of the sheet (this file) until we reached the bottom and then we would turn over the sheet of paper and so on. If we wanted to write to each data space we would find that it would not fit on that line, there we would have to choose that piece of paper to go up and start with a new and make pages. In practice of course you would probably not sequence an entire record of two or but when using disc drives you obviously can't.

A relative file is therefore located as your piece of paper at the start you decide how wide it is to be (the record length) and what name to call it. These two things defined the changed later and so it is important that you get these right from the start. You can write past the end of the file off the bottom of the paper then a relative file is automatically made itself to zero. This is called jumping. When we create a relative file, we will generate it. The reason for this is that jumping takes extra time which you will not want when your program is running. Another point is that if you try to write past the end of the file, the disc drive will test if it returns an error (EO—end of record present) which is only just a warning message. When you



records with the same key is slow, it always returns the same number. You can, of course, write your own algorithm to have and for some applications this will be very important. The particular one goes along the key and takes the ASCII of every character and multiplies it by it's position in the key and then adds it into a variable 'a'. The reason that we must multiply by the position is so that every 'ABC' does not give the same result as 'CBA' and so on. Having done this we used the random number generator with the negative value and then take the remainder of that number and convert that into an integer between one and the file size which is 47. The result is returned in 'd'.

```
2500 rem hash routine - given key in 'b'
2510 rem returns hash position also in 'd'
2520 rem 'a' is 'a'
2530 rem 'a' is 'a'
2540 rem 'a' is 'a'
2550 rem 'a' is 'a'
```

We now need one more subprogram to make use of this 'hashing'. This will return a variable 'm' as to whether we find a record or not. Another variable returned is 'o' and we will use this for deleting and creating purposes. I will explain this later on. Remember that when we create a relative for all of the records have got already in there and so looking a record we pass the routine the key and a counter the hash number and then scan the file until it finds one key or a chr(255).

```
2560 rem 'a' is 'a'
2570 rem 'a' is 'a'
2580 rem 'a' is 'a'
2590 rem 'a' is 'a'
2600 rem 'a' is 'a'
2610 rem 'a' is 'a'
2620 rem 'a' is 'a'
2630 rem 'a' is 'a'
2640 rem 'a' is 'a'
2650 rem 'a' is 'a'
```

Line 2540 needs a little explaining. For our purposes we will have a file with one hundred records. If a key hashes to record one hundred and that is already occupied then the next position to look at is record number two. Even then you can now see the above scan you end in the file which is why it is called a circular file.

Using the routine

The following program gives an

example of how to use these routines. Type them in and try them and I will then explain how they work and the importance of the delete flag.

3330 rem program type 'c' for closing and type in the key in 'a' and any data that you want to be the record. Note that the program creates a new record file called 'new' to be set up with a maximum of one hundred records and a record length of about 100 bytes. When the key 'abd' is created it is created at position 42. This is not too far off from the key in upper case as if you moved lower and upper case. If you want to avoid problems with upper and lower case then change line 3340 to this:

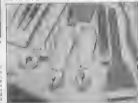
```
3340 rem 'a' is 'a'
3350 rem 'a' is 'a'
3360 rem 'a' is 'a'
3370 rem 'a' is 'a'
3380 rem 'a' is 'a'
3390 rem 'a' is 'a'
3400 rem 'a' is 'a'
3410 rem 'a' is 'a'
3420 rem 'a' is 'a'
3430 rem 'a' is 'a'
```

```
3440 rem 'a' is 'a'
3450 rem 'a' is 'a'
3460 rem 'a' is 'a'
3470 rem 'a' is 'a'
3480 rem 'a' is 'a'
3490 rem 'a' is 'a'
3500 rem 'a' is 'a'
3510 rem 'a' is 'a'
3520 rem 'a' is 'a'
3530 rem 'a' is 'a'
```

Now delete 'abd' and try to amend 'dcr'. Having done this change line 3440 to what it should be. To overcome this we have a special flag on the file. I have chosen to use chr(254) as you are very unlikely to have this in your key - if you did use it as a valid key, you would cause havoc with your data! Using the above example, deleting 'abd' will cause a chr(254) to be written to the slot at position 42. The routine for scanning for a key at 2550 will treat this as any other key and not assume end of file. The only special handling

is when the variable 'd' is the same as position one and then you look a chr(254) is used to that slot position. Note that on one slot, it only can 'd' to the first chr(254) found as there may be others. This flag is then used in the create part on line 3490. This routine routine basically says check the key does not already exist: if not then enter the data, scan across the record to determine the position of the chr(254) found by the scan routine and then write the data. We were scanning for found a chr(254) - if so then create it there at that position (d).

Using the above routine you should have a reasonable fast access system. As more items are put in, the access time will slow but should remain acceptable until the file becomes about 90% full. Even full this is dependant on how good your hashing algorithm is and a point amount of luck as to whether the keys used create a good spread across the file.



scanned by 'abd' and so it is created at position 41.

Deleting records

We now have a method of creating and amending records using keys. Unfortunately, deleting is a little more complicated. The obvious thing to do when deleting is to place a chr(255) in the deleted record position. If we did this and changed the key 'abd', we

```
3540 rem 'a' is 'a'
3550 rem 'a' is 'a'
3560 rem 'a' is 'a'
3570 rem 'a' is 'a'
3580 rem 'a' is 'a'
3590 rem 'a' is 'a'
3600 rem 'a' is 'a'
3610 rem 'a' is 'a'
3620 rem 'a' is 'a'
3630 rem 'a' is 'a'
3640 rem 'a' is 'a'
3650 rem 'a' is 'a'
3660 rem 'a' is 'a'
3670 rem 'a' is 'a'
3680 rem 'a' is 'a'
3690 rem 'a' is 'a'
3700 rem 'a' is 'a'
3710 rem 'a' is 'a'
3720 rem 'a' is 'a'
3730 rem 'a' is 'a'
3740 rem 'a' is 'a'
3750 rem 'a' is 'a'
3760 rem 'a' is 'a'
3770 rem 'a' is 'a'
3780 rem 'a' is 'a'
3790 rem 'a' is 'a'
3800 rem 'a' is 'a'
3810 rem 'a' is 'a'
3820 rem 'a' is 'a'
3830 rem 'a' is 'a'
3840 rem 'a' is 'a'
3850 rem 'a' is 'a'
3860 rem 'a' is 'a'
3870 rem 'a' is 'a'
3880 rem 'a' is 'a'
3890 rem 'a' is 'a'
3900 rem 'a' is 'a'
3910 rem 'a' is 'a'
3920 rem 'a' is 'a'
3930 rem 'a' is 'a'
3940 rem 'a' is 'a'
3950 rem 'a' is 'a'
3960 rem 'a' is 'a'
3970 rem 'a' is 'a'
3980 rem 'a' is 'a'
3990 rem 'a' is 'a'
4000 rem 'a' is 'a'
```

Listing 2

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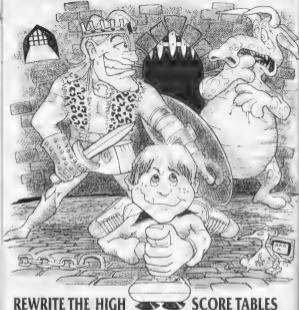
White Lightning is the only game that's taking the 80's by storm without being repetitive. It's the only game that's taking the 80's by storm without being repetitive. It's the only game that's taking the 80's by storm without being repetitive.

White Lightning is the only game that's taking the 80's by storm without being repetitive. It's the only game that's taking the 80's by storm without being repetitive. It's the only game that's taking the 80's by storm without being repetitive.

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E

Simon Palmer comes out of his shell to look at the Valiant Turtle and the language it speaks, LOGO.

ONE OF THE MOST STEPS so far in educational computing has to be LOGO. It is a language which is very powerful yet simple to use. LOGO is a language which children find easy to grasp, as so many of the fundamental words which make it up are the same as the words in the recognised English dictionary. They are designed to achieve, for example, if a child using LOGO's graphics system required the TURTLE on the screen to move forward a set number of steps, he would not have to worry about remembering the BASIC program but simply type 'FORWARD' and there a number of steps. One of the main advantages of LOGO is a distinct advantage when teaching a language.

Now, in the past few years a valuable extension to LOGO has been developed. In previous years people who owned a TURTLE was either rich or had built it. However, they have become much more freely available, and at a price that can be afforded by the everyday user. The TURTLE is a robot which can be controlled by the computer using LOGO. It is usually used in conjunction with LOGO's 'Turtle Graphics'.

When these 'parts' were first introduced they were attached to the computer by an umbilical cord which transmitted the data to the robot. This was a disadvantage as it limited the range of movement. The robot was also bulky and expensive which meant that most schools could not afford to own one.

Volume manufacturing has since led to a decrease in prices. Tencho say has improved ten fold and the size of the components has halved.

TURN TURTLE

This has led to some exciting developments such as Valiant Design's TURTLE.

Welcome to the World of LOGO.

LOGO is a language that has for some time been given little press acknowledgement of its existence in the UK, by the general public. A few pockets of activity in schools or computer clubs and the odd article have reminded people of its existence. Perhaps because it doesn't have the software, games or otherwise it has been unfairly overlooked. But the time has come for people to recognise that it is not just another language but that it is more powerful than BASIC.

LOGO is a procedural language. This means that when a program is generated, it is structured out of procedures. These procedures are either the primitives of the language or have been created to perform a certain function. When a set of procedures are used together, they also call on each other to determine a result as well as performing their own independent tasks.

Speak the same language

In LOGO, the language has been specifically designed to bring both the English Language and the Computer Language closer together to enable use by a greater spectrum of ages. The words

used in LOGO are very close to the words that would describe the function in English. By an analogy, a child or adult could start using LOGO almost immediately. LOGO enables the user to define a function and then allow him to use a word to define the task in question. He can then use the word every time the program requires this task to be performed.



The best way to describe LOGO as it is a word processor. You have the printers (LOGO itself) at the bottom and on those you can draw structures and you have a very good at the top which will perform the whole program, called a SUPREMACY (S.M.A.C.).

Commodore logo

In the plain, small, no-frills Commodore supply you with the Language (in disk), the manual which totals well over 300 pages, a setup disk and a damaged disk replace-

ment card. When I ploughed through the manual I found it easy to read and understand, but if I had been a senior or eighth year old working alone with LOGO then I would have had difficulties. I would, therefore, suggest that if you are a parent thinking of buying LOGO for your son or daughter, make sure that you can get hold of wordbooks for beginners and then use the manual as a reference instead of a tutorial.

After saying that, I must confess that even a little by adding that there is a Utility Disk with some fine examples of LOGO graphics and other items, contained with the Language disk which might help.

Logo Graphics

This is the most powerful version in LOGO. It is worth remembering that a child will find working with a language more stimulating if he or she can make pretty pictures or draw a house or just be very creative. So it is logical to think

Example 1

```
TO SQUARE
FD 50
RT 90
RT 90
RT 90
FD 50
RT 90
RT 90
END
```

Example 2

```
TO SQUARE
RT 45 FD 50 RT 315 FD 50
END
```

Both of the above perform the same task. One is simply an abbreviation of the other.

In Example 1, I gave the procedure the name SQUARE, I then gave the commands (FD forward) 50 and RT (right) 90 four times. This made the 50, 90, 90, 90, 50 units forward and turned 90 degrees to the right four times. Example 2 does the same, except I have used a primitive and a different way of getting the angle by dividing the total number of degrees in a circle by the four sides.

So, after playing with the standard graphics via LOGO I decided to move on to higher things. I ploughed through the manual and I came to the fourth chapter, which was, I found that the L-system disk not only contained examples of how the Sprites could be used but also a Sprite Editor to make the design of Sprites, which is a tricky problem.

For example, if you wanted to move a Sprite across the whole of the screen you would have to set the left (also rightmost) bit, which is Location 50000. This would, in BASIC, enable a Sprite to move on its two-ordinate screen to the right-hand edge of the screen where the register would instantly be greater than 55. Well, on LOGO that is already taken care of.

What about some to background and Sprite to Sprite collision? The detection of a Sprite hitting another Sprite is again a complex affair! But on LOGO there are two procedures based on the L-system disk which enable the computer to ignore the necessary

data to do one of a collision has occurred. They are "TB" which checks for background collision and "TC" which checks for Sprite to Sprite. A real no complex problem is getting an enlarged Sprite to get location 51,071 and 51,077 which control expansion otherwise on LOGO, S.M.A.C. handles, S.M.A.C. will suffice to complete the job.

I was staggered, however, that the manual does not make any reference to high colour Sprites. In the 21 pages on Sprites I dealt with everything from defining to using, but nothing at all on hi-colour. I made it is also worth pointing out that most of the control of Sprites, i.e. the commands, can only be found on the Utilities disk so it is worth making a backup copy just in case something happens.

Sound

When I loaded the first file for music on the Utilities disk called MUSIC, I watched it enter the various procedures required to gain Sound. I was expecting some commands to be defined but unfortunately none were such as Attack, Decay, Sustain and Release are there. In all fairness, even though the procedures defined for music are simple, they are the important ones required for complex music making and obviously, if there isn't enough there, you can create a new procedure by using the various LOGO machine code primitives.

Machine code

It is worth mentioning the subject as we are in LOGO and LOGO is supposed to make the execution of code easier, then, again some former knowledge of programming is required if you are going to benefit from the various command supplies.

And, I have supplied on the Utilities disk a copy of an assembler to enable the structuring of code. The manual then goes on to explain how to run the LOGO

that when the language was designed with education in mind, that it would be heavily oriented towards graphics. For example, if I wanted to draw a square in LOGO I would not have to think of the unique bits of BASIC, it could simply type the following:

assembler and also given an example of how to change colours via machine code.

Words, words, words

Words and Lety is the largest section in the LOGO language book even though it covers a relatively small area (17 pages). Whereas the graphics section was, in most cases, bit of a direct input and result nature, Words and Lety requires student operations.

This set of procedures allows you to generate data based on the way to "intelligence" software, how I am not going to get into the arguments of whether computers can or cannot be intelligent, but with the aid of the graphics the computer can learn and repeat after a specific action has happened.



Cambridge has supplied a game on the Lolomo disc to illustrate this very point.

Finally

Much more on the fascinating subject, can be found on by using the package and the TURTLE together or just LOGO on its own. It is worth bearing in mind that even though it is a teaching language, the facilities of a high-level language has been incorporated. Items which appear when LOGO but do not appear in BASIC can also be found in the more powerful languages available on the open market. To what the user has learned to work with some extent, but this, without changing languages, goes right on to higher things.

The Valiant designs Turtle

The Valiant TURTLE, designed for use with LOGO, is prepared for birds and ready to run as soon as you remove it from the box. It comes complete with an in-built controller, a power supply/charger, the various manual and paperwork, and obviously the software.



On your marks

Before starting to convert the TURTLE I read through the manual. The points which are worth noting here are that the manual can be read by anyone. If they are being taught, it's an aid and if you are teaching it is a guide to enable smooth operations. The manual does contain a large section of exercises illustrating the various stages in which the TURTLE can be delivered and these highlight very well any problems that might occur when setting the machine up for doing operations. They also had the foresight to include a large section on troubleshooting and the various remedies to be able to return to any stage of TURTLE.

The one criticism I must make is that even though there is a high-quality language called PHILIP included, it would be to have seen a few example programs contained within with the software or the manual.

Get set

After passing the paperwork, I started to set up the hardware. Firstly, the TURTLE itself. Constructed out of very robust

plastic, the green see-through shell provides a perfect view of the internal workings which have been anchored safely to a cream base. At the front of the TURTLE two light-emitting diodes give an indication of whether the TURTLE is up to strength by maintaining a constant light on by flashing to indicate that recharging isn't too cold. On the top of the head of the TURTLE are two pairs of LEDs. These tell you whether

the signals are being received by the TURTLE or whether it is recharging itself.

The in-built transmitter goes into the User Port as the C44 64. The transmitter is powered by a transformer which also recharges the TURTLE. Once the various items are plugged in and you have loaded the LOGO package into the computer, the TURTLE software can be loaded.

Go!

The Valiant TURTLE software, when loaded, replaces more of LOGO's provision. This makes writing software which can work with the TURTLE a little bit difficult as they do not describe what has been changed. Now everything has been set up, you can check the accuracy of your TURTLE values supply with the TURTLE one marker pen and also see whether or not the TURTLE is ready to work you can set, and the ability to enable a greater degree of accuracy when drawing.

The final and best way is to get the TURTLE to draw a square. To SQUARE

REPEAT 40 90 RT 90:0. The above procedural LOGO should be enough to make accurate adjustment. The adjustment is made by turning the screws which move the wheels either nearer the TURTLE body or further away.

Turtle on the run

The TURTLE when working moves at a steady speed. One problem I did come across is that the space between the wheels and the floor is very small, this will lead to the TURTLE catching itself and being left high and dry, to make sure it is used on a level surface.

The final item to be mentioned to the TURTLE was the marker pen, this consisted with a holder which is supported by a small semicircle. The two LOGO commands to it is and lower the pen are PHILIP and PHILIPDOWN (PL and PLDOWN short). Make sure that when you write a procedure to incorporate some TURTLE graphics with movement of the robot you use these commands otherwise, like I did at first, you will get many lines that you bargained for.

From start to finish

I found the TURTLE a pleasure to use it is very easy to set up and even easier to operate. Commands such as TURTLE which will convert the input from the computer to the TURTLE or, if the command is repeated, will stop the signals are very useful. The command of the TURTLE can be opened up marginally by hiding the computer's spare words of the TURTLE. This means that a time for the computer to operate.

So, taking all into account the TURTLE is a valuable extension to the computer system.

LOGO is available from Cambridge and costs £149. TURTLE is available from Valiant Design Ltd, 10 New Park House, 140 Barnston Park Road, London SW11 6AB, 01-873 5195 x 541.



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Dave Crisp throws some light upon a couple of the more popular lightpens on the market.

A COUPLE OF YEARS AGO IT WAS ALREADY possible to see lightpens being used on the most expensive computers. But now more and more the lightpen has been made to suit the old Mac Special machines, thus giving the user the ability to simply touch the screen with their finger to make a decision relevant to the program, but it is going to be a long time before the system is available at a reasonable enough price to implement in the home.

Until there are things that can take the place of the keyboard in some respects as lightpens, it is called a lightpen because of its shape and the fact that it responds to light emitted from the TV or monitor screen. A head connects the pen to the port on the computer and it is linked to the main program by electrical contacts which are able to detect the pen's position on the screen. It is able to do this because the monitor screen is treated in a particular way. When the lightpen is pointed at the screen and a switch is pressed, the detecting software tells the pen the position of the pen from the point at which the ray is detected.

In older pens, sometimes light often made reading the position of the pen a very hard and inaccurate job, with improved accuracy, it is possible for the pen to point only to light from the monitor. The main use for lightpens has been for many years to be for drawing and design programs. Software detects the position of all the pen on the screen and as you move the pen a line may be drawn or the position of the pen may be a reference point for the start of a line, circle or triangle etc. It is also possible to indicate the point of a drawing which is to be filled with colour. All these things could be done with the cursor keys but in most cases the use of a lightpen speeds up positioning and improves accuracy.

Another use for a lightpen is in programs which a lot of drawings are to be made from. I've had the track lightpen. I have been able to write a couple of educational games where my younger daughter can complete the whole program without using the keyboard. There is no need for her to be able to recognise letters or keys at the options can be displayed on the screen in a graphic form and the options can be made from the pen.

It is usually fairly easy to adapt some written software to work with a lightpen, but it is always a job to overload and write the pen. If the user continually has to go from the lightpen to the keyboard and back again, it becomes as much a trial as a delight. I have not seen much software able to use with lightpens in a useful way and, as I am a nurse by trade and have a couple of patients who have lost most of the use in their arms, I feel that it should be possible for me to write

FANTASTIC



software where they are able to use a computer in many ways using only the lightpen, possibly in their schools to amuse, educate and help them.

Datapen lightpen (price £25.95)

The Datapen Lightpen is easy to use and comes with three programs to get you started. It is plugged into one of the joystick ports and the lead is long enough to enable you to reach all the screen. Although that sounds obvious I have seen a lightpen where it was so long it was in reach one side of the screen, the software with the pen (large boxes) can be used easily to this, and the first program simply tells a line about the program and enables you to move small graphics around the screen. It also shows the movement of the pen affects the variable values used in the detection of the pen point. The other two programs are for drawing in straight lines. The first is a line drawing block program in all the colours on the screen. The second is a line drawing in light and dark. This mode is, single colour but, with precise step like drawings could be achieved and then save to tape. In order to save the job it was, best necessary to slightly adapt the program. My young children enjoyed the two graphic programs and soon they became quite proficient. The manual that comes

with the pen is of a fairly low quality but it is packed with useful information which makes using the lightpen in your own programs very easy indeed.

Quality of finish

When you use it in your own software the switch on the pen can be programmed in such a way as to make the pen responsive until the pen is at the desired location or to perform a particular operation when it is pressed. This is a feature that has missing on some other pens and a real three different to use. The quality of finish on the pen was not too much compared to the track lightpen but it was robust. The hole at the back of the pen into which the LED (grouped) seemed to have been cut out with a hammer and chisel and the moulding of the body was rather spoiled by a large amount of flash. Small points there but it could have been finished a little better. The LED is there to indicate that the pen is working some sort of signal and goes out a distance from when played. In fact, the switch is pressed it glows brighter and seems to indicate as a visual reminder that the position has been calculated. I enjoyed using the pen and I am sure that, a while time, I shall be able to use it to its full potential. It can be made into a useful item as much at home, in business and education, as in games.



This month Reynolds

Philips examines the
creation of User
Defined Graphics on
your VIC 20.

VIC GAMES PROGRAMMING

THIS IS THE FOURTH OF A four-part series of BASIC Games Programming for the VIC 20. The series is primarily intended for newcomers to game programming, but there might well be a few useful tips for seasoned programmers.

The VIC 20 has a very well thought-out system on which can be used to good effect in many games. However, if you were a single character to represent an object such as a dog, an alien or a spawning fly really stretching the imagination too far to reach the standard graphics set. To get a professional look to your game you need to define your own characters. The steps involved in creating User Defined Graphics (UDGs) are outlined below.

1. Make room in the memory for the graphics set.
2. Calculate the data for the UDGs.
3. Put the UDGs into the expanded memory and store the VIC 20 to use the UDGs.

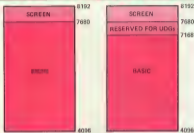
It sounds a lot of work, but and in practice it's quite straightforward. A few POKEs and Data statements, and you're there — but let's start at the beginning.

Making Room for the UDGs

The standard character set supplied with the VIC 20 is stored in ROM, and it can't be altered. If you want your own customized graphics, yet you have to put it in RAM. The way you do this depends on what expansion you have on board. This month we will be converting the L413944040 VIC 20, and I will go over the procedure for doing such repairs on in the next article. The memory map for the unexpanded VIC 20 is shown in Fig. 1a. You can see for the top of 64K memory passed to POK as shown in Fig. 1b. Switch on your VIC 20 and enter

POKE15,28:POKE16,28:CLR

That's it. You've changed the memory map. Now enter



1a and 1b

POINT PRINT

If a game opens up 8000 bytes, you feel some BASIC, but you've gained enough space for your UDGs. In fact you've got more for 64K — that should be enough for most games.

Designing the UDGs

Each VIC character set made up from an 8x8 matrix of pixels, as illustrated by the rocket in Fig. 2. This matrix is made up of 8 rows, each of which can be represented by a binary number as shown in Fig. 3a. The binary number is also and simply by designating each pixel which is switched on as 1, and each pixel which is switched off as 0. The binary number is then converted into decimal as shown in Fig. 3b.



1a and 1b

The graphics is simplified by starting off with a blank grid as shown in Fig. 4, then filling in the required squares, and adding up the numbers shown at the top of each column to give the decimal value of each row.

We'll design three now, all that is left is to POKE the character data into the allocated memory locations.

Entering the UDG data

Having re-defined the VIC memory, the characters are

Figure 2a

2^0	= 16
2^1	= 32
2^2	= 64
2^3	= 128
2^4	= 256
2^5	= 512
2^6	= 1024
2^7	= 2048

READY.

1 REM LISTING 1

2 :

10 POKE32,28:POKE36,28:CLR

20 FORL=743207439:READ:POKE:L,0:PRINT

30 DATA15,55,48,55,100,124,84,55

Listing 1



Listing 3

```

1 REM LISTING 3
2
3 GOTO 2,2
4 FOR CT=0,255 STEP 10: PRINT
5   IF CT=0 THEN PRINT "CT=0"
6   IF CT=10 THEN PRINT "CT=10"
7   IF CT=20 THEN PRINT "CT=20"
8   IF CT=30 THEN PRINT "CT=30"
9   IF CT=40 THEN PRINT "CT=40"
10  IF CT=50 THEN PRINT "CT=50"
11  IF CT=60 THEN PRINT "CT=60"
12  IF CT=70 THEN PRINT "CT=70"
13  IF CT=80 THEN PRINT "CT=80"
14  IF CT=90 THEN PRINT "CT=90"
15  IF CT=100 THEN PRINT "CT=100"
16  IF CT=110 THEN PRINT "CT=110"
17  IF CT=120 THEN PRINT "CT=120"
18  IF CT=130 THEN PRINT "CT=130"
19  IF CT=140 THEN PRINT "CT=140"
20  IF CT=150 THEN PRINT "CT=150"
21  IF CT=160 THEN PRINT "CT=160"
22  IF CT=170 THEN PRINT "CT=170"
23  IF CT=180 THEN PRINT "CT=180"
24  IF CT=190 THEN PRINT "CT=190"
25  IF CT=200 THEN PRINT "CT=200"
26  IF CT=210 THEN PRINT "CT=210"
27  IF CT=220 THEN PRINT "CT=220"
28  IF CT=230 THEN PRINT "CT=230"
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99  IF CT=255 THEN PRINT "CT=255"
100 IF CT=255 THEN PRINT "CT=255"

```

Imaginative use of LOGs

To finish off this month, it's worth thinking about some of the things we can do with the LOGs, apart from simply

reading them as little objects which change position around the screen. There's enormous scope, and if you're not careful you'll step into the realm of computer art and forget all about that game you want to write!

PEROV

Listing 4

```

1 REM LISTING 4
2
3 FOR CT=0,255 STEP 10: PRINT
4   IF CT=0 THEN PRINT "CT=0"
5   IF CT=10 THEN PRINT "CT=10"
6   IF CT=20 THEN PRINT "CT=20"
7   IF CT=30 THEN PRINT "CT=30"
8   IF CT=40 THEN PRINT "CT=40"
9   IF CT=50 THEN PRINT "CT=50"
10  IF CT=60 THEN PRINT "CT=60"
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99  IF CT=255 THEN PRINT "CT=255"
100 IF CT=255 THEN PRINT "CT=255"

```

You can design some really good characters by making a block of several LOGs. Even a modest 32 block can look quite realistic. If you type it and RUN Listing 4 you'll get a task.

By using several LOGs to represent an object you can get reasonably realistic. You can really make a ball look as though it's bouncing by squashing it as it hits a wall, or you can make phony alien men run across the screen by listing 4 — you'll see what I mean. By working with hard you can simulate water movement lines and RL's Listing 5, and work out how it's done.

Finally, you can use LOGs to give you lots of movement quickly. If you alter the

configuration of a LOG during a program then quick representation of that character will change. Suddenly, instead of an alien, maybe the alien simultaneously has a tail. Couldn't be put to effective use. Couldn't be!

Next Time

If you've followed this series through you should now have all the tools at your disposal to write running and effective games in BASIC on the Commodore 64.

Last month I'll cover memory expansion, and go through some of the techniques which can be used to get a lot of polish to your programs.

Program Listing 5

PEROV

```

1 REM CHARACTER DEFINITION
2 REM PEROV: P=PEROV: O=OROV: V=VOROV:
3 REM PEROV: P=PEROV: O=OROV: V=VOROV:
4 REM PEROV: P=PEROV: O=OROV: V=VOROV:
5 REM PEROV: P=PEROV: O=OROV: V=VOROV:
6 REM PEROV: P=PEROV: O=OROV: V=VOROV:
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99 REM PEROV: P=PEROV: O=OROV: V=VOROV:
100 REM PEROV: P=PEROV: O=OROV: V=VOROV:

```

[illegible]

C

Owen Manderfield
shows you how to
easily control
characters by inserting
'REM' lines into BASIC
programs.

HAVE YOU EVER TRIED
typing in letters of BASIC
programs for your Com-
modore (developing long lists
of control controls and control
characters)? If so, you will
probably know that decipher-
ing the graphic symbols
representing these controls
can be very difficult. This is a
real problem for programmers
producing programs for
publication in magazines such
as this one, as the programs
have to be typed in from a
printed listing. One way of
overcoming this problem is to
document your programs with
BIM* statements, explaining
the control characters used.

Here is a simple machine
code routine which inserts
BIM* lines in any BASIC
program held in memory
loaded into before every line
that contains the line

ALL CLEAR



Program Listing

```
1000 PRINT"BB-BLD"?
```

There is a low 1000 is shown
showing that a "line" right
end is "line" down" character
are to be joined.

```
1010 REM CUB-CUB  
1020 PRINT"BB-BLD"?
```

The dash between the two
characters shows that the
control characters are next to
each other. If they are
separated, then a space is
printed, e.g.

```
1010 REM CUB-CUB-RES  
  
BTHRE BB-CUB
```

It means that "BTHRE" is
printed in red, "BTHRE" in black
and "YOUT" in green. Green
function keys can also be
shown.

```
1000 REM F1 F2  
1000 FPR="B"DATA="B"
```

```
10 REM F1 F2 T1 T2 L=1000 F=0  
20 C=B L=L+1 B=F B=F B=F B=F  
30 REM B.A FPR="B"DATA="B"  
40 FPR="B"DATA="B" STEP2 B=F B=F B=F B=F  
50 L=1000 B=F B=F B=F B=F  
60 REM B.L C=B C=B FPR="B"DATA="B"  
70 NEXT FPR C=B C=B FPR="B"DATA="B"  
80 T1=T2 B=B B=B  
90 B=F C=B C=B C=B C=B C=B C=B  
100 B=F B=F B=F B=F B=F B=F  
1000 DATA 1010  
1010 DATA 1010 1010 1010 1010 1010 1010  
1020 DATA 1010 1010 1010 1010 1010 1010  
1030 DATA 1010 1010 1010 1010 1010 1010  
1040 DATA 1010 1010 1010 1010 1010 1010  
1050 DATA 1010 1010 1010 1010 1010 1010  
1060 DATA 1010 1010 1010 1010 1010 1010  
1070 DATA 1010 1010 1010 1010 1010 1010  
1080 DATA 1010 1010 1010 1010 1010 1010  
1090 DATA 1010 1010 1010 1010 1010 1010  
1100 DATA 1010 1010 1010 1010 1010 1010  
1110 DATA 1010 1010 1010 1010 1010 1010  
1120 DATA 1010 1010 1010 1010 1010 1010  
1130 DATA 1010 1010 1010 1010 1010 1010  
1140 DATA 1010 1010 1010 1010 1010 1010  
1150 DATA 1010 1010 1010 1010 1010 1010  
1160 DATA 1010 1010 1010 1010 1010 1010
```

CCCCCCCCCCCCCCCC

cell, row, column, or to the sheet as a whole. It is possible to set the display to show integers only, text, rounding to two decimal places and so on. To enable you to enter formulas faster there is the reverse function. This allows you to repeat a cell's formula across the sheet or down according to the range you specify. It would appear to be a vital function but one which is not present on all spreadsheets.

Pictures

A nice way with the sheet is the ability to draw sets of figures graphically. An spreadsheet need to contain a large amount of numeric data it is nice to be able to display a whole row or cell with as a bar chart in order to get an overall picture. In fact a set of numbers with 100 bars can be very noisy and hard to read. You have the choice of displaying in bar or line graphs which mean a bar of examples in line has at a bar of 100 is quite useful in simple but it does the job.

Printout

It is possible to create hardcopy from the end-user either at Commodore's printer or the built-in software interface. The interface is mentioned in the manual but there is no specification. If the specification was there it should be possible to make any printer work using a custom-built cable. I couldn't get some of the work to work and not others, so I can suggest it to try before you buy.

Practical conclusion

It isn't quite make up my mind on this one. It is certainly not a bad spreadsheet but on the other hand it is not the best. If you are a first-time user and want something to use one I think you would like to it up to me. However, for someone who is used to a spreadsheet I think they may have a few difficulties in getting used to some of the odd queries, such as column addresses being at the bottom. I am suffering from a severe bout of indecision. The best thing would be to have a look at stand alone ones you have with C. I would like it somewhere between Borland's Quattro and Microsoft's Quattro.

Inventory 64

From the same company comes INVENTORY 64. My comments about packaging are the same as with Practice 1. The manual is considerably smaller but the program is considerably bigger as well. It is an inventory control system in the words of C.I.A. and is straightforward to learn without the manual. It is easy to learn and getting used to it only takes a short while. The other I call a professional database and so to a professional but that is all some users will want.

Capacity

You are able to hold approximately 655 items per set or list there is no limit on the

more than one disc could not be used if a set equal with the program in the order in which it is discussed in the manual. After loading, the first thing that is required is that you enter the database. Relative to this has been employed in this program and so the setting up of your first set will take some time. Although, once in use, everything for specific items is fast.

The first menu to appear on screen gives you the option to exit, view sales file, data, maintain or produce reports. Choosing options are presented gives you the opportunity to manipulate the records. When entering stock for the first time you will come across the first restriction. It is necessary to allocate the stock new a number between 1 and 999, this cannot be prefixed or suffixed with a letter or anything else and so a stock level of 1000 will be a meaning no number. This is a new item a programming point of view. It is possible to use a hashing algorithm to produce the record number and also to find it again and the other than you but a simple formula. Any program I have written using relative files has been written using a hashing algorithm and so therefore can be precise or at least meaningful. Another problem caused by the use of the a pointer is that you are unable to use the numbers from 100 through to 999. This again is indicative of any programming, but could be put right in a later version.



Standard options

All the functions you would expect of a simple stock control program are there. You can produce a re-order list, on pre-determined levels, a price list at all stock levels, a stock list for reference etc. As I said before, it is a simple program and on the whole performs well. A nice touch is being able to enter the unit or measurement so it is possible to include whether something is packed by size, weight, quantity, and so on. This data it is possible to zero all units to zero, an important feature which has been missed on a couple of other stock control packages I have looked at.

Printer compatibility

This program is written in BASIC. For a program of this type, BASIC is perfectly adequate. The other advantage is that because much no code routines are not written into the core of the BASIC any printer interface you may have will probably work. My interface software on a C6400 (I think) and so works. The interface was simple and clean with everything clearly marked. Total print on stock and total stock value was clearly marked and everything relevant was printed.

Inventory 64 conclusion

A simple program which worked well in what it does. The lack of a few things, e.g. the use of stock numbers and it was not possible to produce any back order lists so if the VAT rate changes and your price included VAT it would be necessary to change each record. It is a good design system and no more important whether it is a lot of time. I like that it is a daily sales program which would have made it useful in applications where a database could be used in fact many parts within the factory etc. With the aid of the other things I hope would be a very useful program. If you were to consider buying it then I recommend that you write down the information you would want from an inventory control package and then see if this program provides what you need. All in all it is not bad for the price.

Practical

From the submitting information Practical was the package I was most looking forward to using. It is a bit of database management system and I spent a bit of time writing odd applications on them. They tend to be extremely useful and can be used in a simple BASIC menu-driven form or alternatively programmed to perform many operations automatically.

As the manual is fairly thick I recommend a couple of hours before reading before actually loading. I would not recommend reading the manual straight through unless you are comfortable with the type of program as they can be heavy going and possibly read quite fast, but as so many database

management programs are rare, so I tend to read through the manual first in order to see if there are any entry details that have not been pointed out in other reviews.

The packing and the manual, unfortunately, are much the same as with the other two programs. The only difference seems to be the thickness and the number of pages. My copy came with a six-page addendum, not to correct mistakes but to clear up some of the manual and to explain procedures not explained fully in the manual. Most of the pages are concerned with the manipulation of files and data from *Practicle* into *Practicle* and *word-wrap*. The material that some degree of experience is possible between the two programs and other sequential files, full marks for explaining it so well, but could not have been done without the manual as fewer pages are so easy to find.

In use

That is only a review and not a full-length report that I will only point out the main features of this package. If you would like to find out more about what these packages are capable of and how they can be used then it may be worth reading a couple of the many good books which are available on database management systems.

After loading, the first thing I noticed was the constant need to change data from reading the manual. I realised there would be a need to change data, but did not fully appreciate just how often the need would arise.

As a simple test I decided to set up a fairly basic file which would enable me to store the data containing stock of software. I wanted some degree of mathematical calculation regarding total values etc. and the ability to search according to program type. Practicle does all this as I expected it would but to be honest the way it did it was almost like screen displays and screens were late and simple, almost to spoil us as you went further through the format routines. I found myself having to draw what I wanted on paper and then translate this into a form that *Practicle* could understand. I seemed to be relying a lot on memory regarding what I had already put in and it had made a mistake I required going through each file to delete and confirming that each item was all right.

Menus were comprehensive but their layout was basic to say the least and awkward using it I constantly had the feeling that I was trying a program to see if it was functioning. On reflection using it back to be added up and presented properly, Unifinder is probably the best way of describing my feelings about this program.

Plenty of space

One thing that cannot be ignored is the easy use of space. Its capacity several entries with an associated number of 5000 files per record. Obviously a record has to be of a reasonable size in order for this many



records to be stored but by anyone's standards some impressive crunching has been employed.

You have a choice of filing methods (sequentially related and depending on the type of file you desire the type of operation will change), a sort feature which could be employed on other databases. By drive I am not just the records you have are small enough to fit into RAM then obviously searching and sorting are also much faster. Despite the criticisms, its design features such as this are impressive. That is one of those small things that make a complete meal of the manual worthwhile.

It is possible to generate virtually any type of report from your records and this is fairly easy to do.

Printing

There is a section concerned with customising *Practicle* which describes various information back to the program (such as these parameters are used each time you use *Practicle*). It covers screen paper and ink colours, whether you are using long single drives or dual drives etc. and the type of printer you are using. As before, I found that some information would work and others would not and so I am afraid I can only leave again, suggest that you try before you buy.

Another feature of *Practicle* is the fact that for using a cassette I could not try

this as I was on 5.25 but, for long term archival storage of sequential data, tape is what it is. It is fairly safe and very, very cheap. Again this is one of those little things that are changing my opinion of *Practicle*.

Yet another of these important but often neglected little things is the ability to batch it. If you are entering a lot of data even random things, seems to take a long time and you are soon conscious of the delay between finishing an entry and being able to start another one. Once again, *Practicle* saves the day. It batch entry is chosen, the data that you type in is temporarily stored in RAM and, at the end of entry, it is organised and stored into a random file. It is interesting just how much time this can save.

Practicle conclusion

I am still a little muddled as the purpose of times I needed to change data and data is maintained by the 'system' screen display but, before all this *Practicle* deserves have me happy, down and conquered, then I add that I think this program is very good. The things I like covered in 'to go' and 'to go' more at the difference. Although I will continue to feel that this program could be greatly improved, it is, without any doubt, a worthwhile. I grew to like it and will continue to use it for some applications.

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consequences, operators will respond to an INPUT statement by entering data which, although correct in syntax, is quite daft. For example, if the prompt is "Enter your age" and the operator responds with 455 then the accuracy of the data is, for all the most suspicious, the computer will accept it as correct, because it is numeric and quite incapable of invalid judgement. It is up to the programmer to include validation checks on all data received from the keyboard.

Example of a validation check

```

100  PRINT "Enter your age"
110  INPUT age
120  IF age < 10 OR age > 100
130  THEN GOTO 100

```

Line 110 would report age greater than 100 or less than 10. These limits are necessary up to the programmer to decide but it is handy to say that a child less than ten years old, however precocious, would be operating a keyboard. At the other end of the scale, it is difficult to imagine how someone past the age of 100 will have sufficient strength left to push down the RETURN key. However, it is often desirable for the program to include an escape clause. For example, it may be that the operator may want to see what happens if he was 101 years old — a kind of digital peep into the future. To cater for such an unusual individuality, the previous example could be modified as follows:

```

100  PRINT "Enter your age"
110  INPUT age
120  IF age < 10 AND age > 100
130  THEN GOTO 100
140  IF age > 101 GOTO 150
150  PRINT "You are 101 years old"
160  GOTO 100

```

This version incorporates the "Are you sure?" trick. That is to say, if the data supplied is outside the limits, it is finally



accepted only after the operator has been given the chance to confirm or reject by entering another 1 as he knows not. Now that line 110 uses the AND connector in between the two tests instead of the OR. It now checks to see if both things are true, and not what happens. You can get into some strange situations with AND and OR. For example, if a number is less than 100 OR greater than 10 then it could be any number within the range — infinity to infinity. This could be a most gross pair of limits, but if we had used AND instead of OR, the variable is tightly bound. We will be dealing with the AND, OR and NOT connectors on a great detail later in the book when we discuss logical operations in the machine, but if you can envisage the program in a better way, remember though, if you have to use more GOTOs than we have done it should not be considered an improvement.

The INPUT statement

The normal INPUT statement is used for entering data from devices other than the keyboard. Data can also be entered on a data tape or tape card and read in from the program by means of the INPUT statement. However, we do not think this is the best place to treat the subject because it demands a knowledge of channel numbers and other parameters. INPUT is less relevant later in the book under the heading of tape and disks.

The GET statement

The INPUT statement is used for entering data as more characters from the keyboard, the RETURN key being used to advance the sequence that so many are to follow. The GET statement is different. It is used to enter a single character and does not require the RETURN key. At least as we press a key, the character is entered immediately into the variable. Thus, if we enter GET A to GET A, any key pressed is entered immediately into the variable A or AH. However, some strange things can happen unless you understand the action of the keyboard buffer. This is a small memory, capable of holding only two characters. Whenever a key is pressed, the character code of the key is entered into the buffer. When we use the



The best place for this is immediately, or at least soon, after the INPUT statement. It will take the age query in an

displaying variables and will work with the instructions required to present them. To start with, let's use what a simple array variable such as `Array`, or `Array1` if it is to hold strings like, "The general form is:

```
array-name (array) dimension
```

For example, we can store something in `Array` and something else in `Array2` etc. etc. If we use our code something as `Array2` it will work. The array name is, in this case, `A`, which may be considered as a pointer

However, it is more to confirm that something has happened or we now use `PRINT Array2` or `PRINT Array2(1)` if there is a loop of 10 of `Array2` items it would be more professional and certainly quicker to use a simple loop to read in the data. For example:

```
FOR I=1 TO 10: A(I)=  
50: B(I)=A(I)  
NEXT I  
FOR I=1 TO 10: B(I)=B(I)+1  
NEXT I
```

When this is run, the last revolution of the loop places 10 in `A(1)`, the next revolution places 1 in `A(2)` and so on. To prevent this `PRINT A(I)` you should see 10 displayed on the screen. You should try to get into the habit of using `PRINT` in short code to test what happens after a run because it can become a powerful debugging weapon. If you think that some variable should have a certain value, a quick `PRINT` of the variable will confirm or reject your beliefs. After all, there can be a difference between what you think should be in, say, `Array` and what actually is. If you want to find dimensions at the computer by all means, do so, but, instead, you will find it is something you have overlooked.

The DIM statement

In the last example, notice that the loop was from 1 to 9. The loop was designed to keep to a modest size to avoid having to dimension the array. It is a peculiar array of any size that the computer must be prior informed of the number of elements in the array is to avoid errors, that is to say, the highest allowable subscript is 10 (the value for the 9

subset 10). The computer is, of course, programmed to do something near the top of the program, by the `DIM` statement, the general format of which is as follows:

```
Dim array-name (number)
```

For example `DIM Array(100)` will reserve 101 locations to hold the variables with subscripts within the range 0 to 100. Once an array has been dimensioned, you must use it in the program to re-dimension or you will get the error message, `Out Of DIM ARRAY`. This is understandable when you think about it. Once the computer has gone to the trouble of allocating its resources for your array, it is going to be very annoyed if you later change your mind within the same program. If you must re-dimension, you must first clear the computer of all variables (such as for crashing recovery and not to be taken lightly) by using `CLS`.

consider a matrix of numbers as follows:

1	2	3	4
5	6	7	8
9	10	11	12

It consists of three rows of four columns, and could be described as a 3x4 matrix. We could then imagine this stored



as an array `Array(3,4)`. Thus, `Array(3)` would hold the number 8 (because it is the first column of row 3, the first 8 is in `Array(3)` and the number 3 is in `Array(3)`). We should stress that it is not essential to allocate the first subscript to rows and the second to columns. How you allocate or use the array is your own choice — the computer has to get a clue what a column or row is anyway.

The following few lines will read in the 12 data items into a two-dimensional array and print them to the screen at a value of 1 (rows) and five (cols).

```
FOR I=1 TO 3  
FOR J=1 TO 4: A(I,J)=  
I*J: B(I,J)=I*J+1  
NEXT J  
NEXT I  
FOR I=1 TO 3  
FOR J=1 TO 4: A(I,J)=  
I*J: B(I,J)=I*J+1  
NEXT J: PRINT
```

The inner loop, loop 10 to 100 begins with 1, then at 1 while the first four columns are read in and printed. The next four columns are similarly read and printed and this time with an `I` value of 2. The last four items are read and printed with an `I` value of 3. Note the colon which terminates line 100 ensures that each row of four items is printed on the same line. The separate `PRINT` statement at line 100 is to ensure the colon effect in order that the next row starts on a new line.



name for a block of separate data. Each individual element in the array is identified by a number, known as the subscript, which must be careful to distinguish between `Array(1)` is a single variable and `Array(1)` is the first variable in an array called `Array`. It is the dimension of the brackets around the subscript which allows the computer that it is one element in an array, the subscript can be any number from 0 to 1000 but, unless specifically warned, it is less confusing if you avoid using the zero subscript. Most people, except computer writers, like to count from 1 to 10 rather than from 0 to 10. To get used to the level of variable arrays and to consider them in two dimensions on the `Array(1,1)` to `Array(1,100)` statements, study the following few lines which will store data items into the array `Array`:

```
FOR I=1 TO 10: A(I)=  
50: B(I)=A(I)+1  
NEXT I  
FOR I=1 TO 10: B(I)=B(I)+1  
NEXT I
```

Type this in and run it. Nothing seems to happen because all we have done is to place the data items into an array.



Multi-dimensional arrays

The type of array variable we have discussed so far is classified as a one-dimensional array. It is possible to extend this idea to include arrays of two or more dimensions. A two-dimensional array has the general format:

```
array-name (number1, number2)
```

For example, `Array(4)` is a one-dimensional variable in the two-dimensional array named `Array`. It is a little difficult to grasp the computer's concept of two dimensions but, suppose we



In most small towns, computers usually have to share shop space with an assortment of other electrical goods. David Crisp visited Minchhead Radio where this is the case.

COMPUTERS IN BUSINESS

IF YOU LIVE OUTSIDE A LARGE TOWN, the chances are that you do not have a shop close-by which caters for people in home moves. However, you can probably buy radios, gramophones and software from your nearest dealer who may be rather one of the national chainware-type shops which sell computer-related products as an extension to its existing business, namely, an audio/video or general store.

Trained staff

In many towns and villages, it is unlikely that a "computer-only" shop would be a viable economic proposition so, by selling computers as a "add-on", the shop may manage to survive by attracting new customers. It also enables computer users to purchase equipment without having to travel long distances.

Despite this being a godsend to most people, the system entails obvious disadvantages. The most common problem stems from asking an assistant, who may be as much a computer novice as yourself, to advise on a specific usage or response. In some cases, you may be given incorrect or at best fragmentary info, such as very dangerous information.

In the early evening days, I wanted to install my domestic lighting system with the computer. This easily, I had a good idea of what I could and could not do but, when I asked for a few extra bits at a shop that pretended to be "expert" in these matters, I was advised to connect the user port direct to the 240v mains. Needless to say, had I followed their advice, I would not be here to tell the story.

Staff training in shops is gradually improving. The large chainstores, on the whole, provide basic but important training in computer sales and use. Gone are the days when, if you asked about your clock, the staff wondered why you were inquiring about their plans for the new year.

Minchhead Radio

One of the many small shops which has taken home moves under its wing is Minchhead Radio. It is situated on the borders of Frome and serves the people within a radius of about twenty miles. In the summer, its business is boosted by a nearby holiday camp but, as the computer boom, the locals provide the



Graham Lawrence of Minchhead Radio

real majority of its business.

Minchhead Radio seemed to have computer items mounted high — a Commodore 64. Suppliers were readily found and, very soon, the whole back portion of the shop was taken over by computers. It stocks a wide range of machines, including the 64 and the VIC 20 and a corresponding amount of software. Obviously, it is a shame for a shop in the outback to stock too many copies of each title as sales per copy are fairly small. Presently, a wide range of floppy discs and manuals are also available in the shop. It is also their policy to stock many items that might be difficult to obtain outside the larger towns. For example, how many shops do you know where Commodore printer interfaces can be bought off the shelf — certainly not many in Somerset?

A large computer-store school has within walking distance of the shop. Come 4.00 o'clock it is difficult to get near the shop as students in this through in door a their eagerness to try out the latest game.

Minchhead Radio is usually successful in sorting out its customers' problems. Graham Lawrence, the financial director of the company, is becoming more conversant with each computer. He says "It is easy to get familiar with our other lines such as video, I V etc but in each computer comes out as a new paradigm for the market. It is a pity that you are devising all your time just to keeping up with what is available and that's without the constant release of new software".

Another problem confronting small retailers is the relatively short shelf life of

many of the games. Graham states "When we hear that a new release is available, it is very difficult to assess the number of units to stock as it is easy to find you have over ordered and, just a few weeks later, you are left with a box full of 'dead' games. Apart from that it is obvious that a lot of copying goes on and this has an adverse effect on the number of sales per game. Copying is a problem and the people who are copying are only doing themselves out in the long run. It is simply a way of making programs 'topical' which will be found and can take increased use would obviously be able to take on a wider range of software".

From the conversations I conducted while I was in the shop, it is obvious that copying amongst friends is a common practice.

All muck in

Nobody in Minchhead Radio deals exclusively with the computer department. As a general store, Keith Johnston, who is usually found in the van delivering T.V.s, videos and microscopes, often have to turn their hands to loading and demonstrating the latest releases. While they haven't got the time to answer queries in this job, Andy and Keith have left Commodore etc. at home in order to learn the basics.

Kate Woodcock is responsible for looking after the main computer system in the back room. She too shows a keen interest in home movies but, again, she faces the problem of not having enough time to keep up with the home computer department.

"Everybody in the shop has to work in when things get busy", says Graham. "In fact, the director. It is obvious that the best arrangement but we can learn from our most problems that arise".

Hard to get

From talking to the two Grahams, it is obvious that different areas in the shop due to the availability of supplies. "Take for example", remarks Graham. "We are not able to get a certain type of sound card, unlike other machines but it was nearly impossible to get a cassette unit. We were stuck with unreliable computers. It was possible to get the T48 discs but how many game discs, it did not buy three elements a 64 and a disc drive in one go".



Ryan, who works at the service department, makes similar comments about the computers: "I could service most of the machines we have here but the supply of PCs is so irregular it's very, very difficult to maintain an inventory stock."

The home computer industry is relatively new and still taking root, but what does the two Gasbarns mean: anything is the way that manufacturers and distributors seem to "jump" the small retail outlet in favor of the large megastore where things get stuck on or peak times like Christmas. "There have been times when we have not been able to get any computers at all. It gives the impression that we are not doing our job properly."

Up to the ceiling

At the rear of the shop, where the computers live, it was easy to see that space is a problem. The software was displayed from floor to ceiling and, when the shelves got very busy, it was necessary a considerable amount of stock through the ceiling.

"Not any more", Graham says to us. "We did notice that quite a bit of stock was disappearing but we now have a good record." It does have a dramatic effect as boxes have dropped considerably since it was installed.

Putting the 64 to use

Down at Minthead Radio's video store a few hundred yards away from the main shop, Sam Hunt is considered under a pile of video tapes. Ron says "We have got about 5000 tapes at the moment and that number is increasing - that is. We do need to take some typical measures in order to get work up and going so we are going to use a Commodore 64. I have one at home and use it a lot and I know that it is capable of doing all that I require."

While talking to Ron, it also became apparent that using the 64 and a price of software such as Superbase, he says it be able to keep an eye on which titles and tapes are most popular. With a good membership and a video list it should also be easier to keep members informed.

Minthead Radio seems to be moving more and more in computers. They are obviously providing a service that is required in the area and seems to be doing it with a high degree of success. It was encouraging to see the 64 being used to much by the shop's staff who have access to a wide range of machines. Ron, for example, as secretary of the local rugby club, is storing the club's records on his own Commodore 64. This only goes to show what a versatile machine the 64 is. Gasbarn is also keen to start stocking the new Commodore models.

For a small shop, Minthead Radio offers a wide range of services. Running home studios is obviously a much harder task than would at first appear. It is time consuming and, on top of its capital investment goes, expensive. I finally left at 4:00 o'clock to be replaced by the local comprehensive's computing contingent.

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This month we show that reading can be all fun and games as Alan Webb assesses some of the Commodore games books on the market.

THE MAJOR PROBLEM ENCOUNTERED by newcomers to computing when they first get their computer is...? "Oooh, what do I do with it?" Quite understandably a really useful game or other program to type in is what they really need to respond to this requirement, there has been a veritable flood of books providing games, things onto the market. There is a small selection of such publications.

Book Title: Winning games on the Commodore 64

Authors: T.F. Barrett and S.W. Colwill

Publisher: Ellis Horwood Ltd
Price: £5.95

From the title of this book, it isn't very clear whether the book provides "winning games" or whether it intends to help you win games. A quick scan of its contents shows that the book has a title more than the stress of its genre. There are in fact two main sections, the second containing 21 reasonably clever conventional games.

The most useful feature is the section which gives a good beginner's guide to the 64. The author covered such as RAM, C compiler, mouse, output as information to screen, file name operations, user defined graphics, sprites, physical features and sound. The brevity of the subject matter was far giving a good fund of information for the beginner. The section on sound was the exception in that it was short and a most of his voice at all. I got the impression that the authors preferred the graphical side of the 64. The chapter on the use of sprites was of some value in as much that a machine code routine is provided for the drawing of the sprites. The routine was in fact used in many of the games in section 2. On the whole the section is probably marginally better than the user's guide supplied with the 64.

The games listings provided were mainly "arcade" style games with the odd educational program. The instructions or guidance notes were minimal and the games were generally well done. I scored with some surprise that simulation or adventure games were included.

Overall, a rather disappointing book which falls badly between a games book and a user's guide and can't really be good for either purpose.





Book Title: 41% Fun projects for your Commodore
Authors: D. Disharoon & H. Kohl
Publisher: Reston Publishing Company
Price: \$6.95

This book is more of a variety of things to do rather than games to play and seems to be aimed at the younger end of the beginner market. The book is split into six sections covering word games, number games, IQ exercises, strategy puzzles, music programs and projects. In my view, the strategic or study of the various games is that apart from being used as they stand, they can be used as a rich source of ideas and hints on programming techniques.

The most notable sections are a word search generator, a complextasker, nine word processors, and several amusing puzzles. All programs had instructions both about how the program and giving some indication on its operation.

If you want to simply play standard stepping games, this book is not for you. If, on the other hand, you need to use the C64 and maximize your mainland programming skill, this book is a good starting point.

Book Title: Games Commodore 64 computers play
Authors: Robert Young & Roger Bush
Publisher: Addison-Wesley
Price: \$6.95

At 179 pages, this book was one of the largest of the collection. On opening the book it is pleasant to note that the book is split into discrete sections, each containing games of a particular type. (As the title indicates, this is a game as a book.)

Section one contains the subcategory

"Arcade" games. As repeated these comprise the usual space, chase and race types. A note worth is that a number have both keyboard and joystick options. Overall a fair variety which should offer something of interest to most people.

Next come the simulations. Four such programs are given representing the main types. First there is a space adventure which, while being tedious, is a reasonably challenging. Two of the games are of the "what if" genre where you change a number of parameters and hope that the result is correct. These games enable you to run a farm or control the Roman Empire. Finally, there is a war game simulating the Battle of Britain.

Last come the "shooting games" in which you must try to shoot faster than a light. These games include 2D shooters & various. Brains, and have a lot of interesting collection but good honest suggestions.

Each program has a page of description that which not only gives instructions on how to play the game but also indicates how sections of the programs function. The introduction has a full listing of the meaning of the C64 control characters and the graphics characters; invaluable if you aren't used to typing in listings.

Generally, a reasonably friendly text which should provide hours of harmless fun at an acceptable price.

Book Title: Challenging games for the Commodore 64
Author: W. A. Roberts
Publisher: Interface Publications
Price: £3.95

This volume presents a varied mix of its games. I got the wrong impression that the games needed to require brains rather than reflexes, but the majority of the games were of the simulation, adventure or strategy type game. The most notable

exclusions were Bowers and Cheques programs.

Taken an exciting book which is hardly better than average.

Book Title: The Commodore 64 Program Book
Author: Vince Appi Publishing Associates
Price: £4.95

This book contains twenty five programs of widely varying size and type including educational programs, games and utilities. Personal, I welcome this book simply were not all of us live for stepping alone. Overall, the programs tend to become outdated for the older user and this book is not suitable as a learning aid for young users.

A.I. programs are listed and I note with interest that the author has acknowledged some limitations of the language by offering a high proportion of serial independent programs. There are a number of adventure/simulation programs which, whilst being lengthy, will give long term entertainment. As the hours of arcade type games, there are a few programs of "stepping" games. Invaluable however these games are a restricted by the use of BASIC.

For those seeking something more useful, there are several items including an assembler and a assembler master. I consider the use of such of the possibility to be disappointing forward. They appear to quite result in preventing the ability to assemble, disassemble, save and load machine code and run the code. The book is almost worth buying for the programs alone.

The quality of the book is good with all listings legible and with adequate instructions and program descriptions. As the price, well worth a long look.

Book Title: Crazy games for your Commodore 64
Authors: H. Renko & S. Edwards
Publisher: Addison-Wesley
Price: £3.75

Here we have a very handy little book of programs of all types. These authors have found an interesting blend of games and novelty programs. It was pleasantly pleased to see you ones for the well known

"Back Back" game and a program to generate father pointers. Overall there are thirty five programs ranging from a rather amusing adventure to a trigger lock also.

A reliable amount of additional information is good with the programs particularly where some theory of operation is required. Overall an excellent little book which represents good value and offers something for everyone.

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